



**PC - OPTIONS**

**Customer Engineer Manual**



**PHILIPS**





**PC - OPTIONS**  
**Volume 1: Internal Control Units**

**Customer Engineer Manual**

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## STATUS RECORD

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X	UPD.	SI No.	PAGES AFFECTED	DATE	REMARKS
1			All	8811	First Issue
2	1		<p>10.0-1, 10.1-1/10.1-2, 10.6-1 thr 10.6-8, 10.7-1 thr 10.7-4 and 10.8-1/10.8-2</p> <p>12.0-1, 12.1-1, 12.1-3/12.1-4, 12.5-1 thr 12.5-4, 12.9-1 thr 12.9-4, 12.10-1/12.10-2 and 12.11-1 thr 12.11-4</p> <p>15.0-1/15.0-2, 15.1-1, 15.1-5, 15.1-7/15.1-8, 15.9-5, 15.9-7 thr 15.9-16 15.11-3, 15.11-5 thr 15.11-10, 15.12-1 thr 15.12-8, 15.13-1 thr 15.13-6, 15.14-1 thr 15.14-4, 15.15-1 thr 15.15-4 and 15.16-1 thr 15.16-10</p> <p>16.1-9 thr 16.1-12, 16.5-5 and 16.11-3/16.11-4</p> <p>18.0-2, 18.1-1, 18.1-8 thr 18.1-10, 18.27-1 thr 18.27-6, 18.28-1 thr 18.28-6, 18.29-1 thr 18.29-6, 18.30-1 thr 18.30-6 and 18.31-1 thr 18.31-6</p> <p>20.0-1, 20.1-1 thr 20.1-8, 20.2-3, 20.2-4, 20.3-3/20.3-4, 20.4-1 thr 20.4-4, 20.6-1 thr 20.6-4, 20.7-4, 20.10-1 thr 20.10-4, 20.11-1 thr 20.11-8, 20.12-1/20.12-2, 20.13-1/20.13-2 and 20.14-1/20.14-2</p>	8904	<p>AST RAMPAGE AT board, 4 x 8 MB memory board (32-bit) and Micron MB-28-DH memory board added</p> <p>WD1003V-SM2, XT Storage Adapter and AT Storage Adapter boards added. Corrections to CM153 CD-ROM controller</p> <p>Multifunction, PCOX COAX, Specialix 8-port and NP600 boards added. Corrections to ICP board</p> <p>Additions and corrections to NP500 and NI5210 LAN Controllers</p> <p>Corrections to technical data and strap settings for OEM 8 VGA controller. AST-3G Plus, additional strap setting added</p> <p>Western Digital 93028-A, 93048-A, Miniscribe 8225XT/8450XT and Rodime 3055 disk drives added. CM201/121 and CM210/131 CD-ROM drives added</p> <p>Additional information added for the following printers: Epson FX80/100, Epson FX80+/100+, Epson FX85/105 GP300PX1, GP300LPX1 Epson FX800/1000 New printers added: Epson FX850/1050 GP310/310F, NMS 1432 NMS 1440/1441 and NMS 1480</p>
3	2		<p>10.1-1, 12.1-1, 13.1-1/2, 15.1-1, 16.1-1, 18.1-1, 20.1-1, 21.1-1, 22.1-1</p>	8909	P2120, P2230, P3120, P3230, P3345, P3360, P9135 and P9165 added in cross reference table

X	UPD.	SI No.	PAGES AFFECTED	DATE	REMARKS
3	2		10.0-1/2, 12.0-1/2, 15.0-1/2, 18.0-1/2, 20.0-1  12.0-1, 12.1-1, 12.1-5, 12.1-6, 12.12-1 thr 12.12-6  13.0-1, 13.1-1/2, 13.4-1 thr 13.4-4  15.1.5.  16.0-1, 16.1-1, 16.1-11/12, 16.12-1 thr 16.12-6  18.0-2 thr 18.0-4, 18.1-1 thr 18.1-14, 18.32-1 thr 18.32-4, 18.33-1 thr 18.33-4, 18.34-1 thr 18.34-4, 18.35-1 thr 18.35-4, 18.36-1 thr 18.36-4, 18.37-1 thr 18.36-6, 18.38-1 thr 18.38-4  19.0-1, 19.1-1, 19.1-3/4, 19.5-1 thr 19.5-4  20.0-2, 20.1-1, 20.1-4, 20.1-7/8, 20.15-1/2, 20.16-1 thr 20.16-4  21.0-2, 21.1-1, 21.1-5, 21.13-1 thr 21.13-4	8909	'Technical Overview' added  Adaptec ACB-2322 added  Archive SC402 added  Sub-section title 'Technical Data' added  Philips 8/16 VGA added  Micropolis 1355, 1558-15, 1654/64-7, Miniscribe MS8225AT, Western Digital WD93028/38/38-X, Rodime 3058/3088/3128A added  Viper 2150L added  NMS1443, NMS1436/00I added  Philips 8CM852 CGA added
4	3		0.0-1 thr. 0.0-4 0.1-1 thr. 0.1-14  10.0-1/2, 10.1-1/2 10.9-1 thr. 10.9-4 10.10-1 thr. 10.10-4  12.0-1/2 12.1-1 thr. 12.1-6 12.11-3/4 12.12-3 thr. 12.12-6 12.13-1 thr. 12.13-4 12.14-1 thr. 12.14-6 12.15-1/2 12.16-1 thr. 12.16-4  15.0-1/2, 15.1-1/2 15.1-9 /10 15.7-7 thr. 15.7-12 15.11-3/4, 15.12-5/6 15.15-1/2 15.17-1 thr. 15.17-16 15.18-1 thr. 15.18-6 15.19-1 thr. 15.19-4 15.20-1 thr. 15.20-6  16.10-3/4, 16.12-3/4	9004	Preface and contents updated. Number list and crossrefer. added.  Intel 32-bit and IMC Memory Boards added.  WD1003V-MM2, AHA-1542A, MITAC Hard Disk Adaptor and External Boot Option added. Additions to ACB-2322.  P9109-003, 3C501, NE1000A and NE2000 added. Correction to NP500. Additional information added for N15210 and LWSI.  Correction to board layout switch settings updated.



X	UPD.	SI No.	PAGES AFFECTED	DATE	REMARKS
4	3		0.0-1 thr. 0.0-4 Chapter 17 Complete Chapter 18 Complete 21.0-1 2 21.1-1 2 21.1-5 6 21.11-1 thr. 21.11-4 21.12-1 thr. 21.12-4 21.14-1 thr. 21.14-4 22.0-1 2 22.1-1 thr. 22.1-4 22.7-1 thr. 22.7-4 23.0-1 2 23.1-1 2 23.2-1 2	9004	Floppy Disk Drives and Hard Disk Drives divided. 8CM875 added. Self tests added. Self tests added. Honeywell Keyboard added. Microsoft Bus Mouse Card added.
5	4		0.1-1 thr. 0.1-14 10.1-1, 12.1-1, 13.1-1, 15.1-1, 16.1-1, 17.1-1, 18.1-1 2, 19.1-1, 20.1-1, 21.1-1, 22.1-1, 23.1-1 10.0-1 10.1-3 10.11 12.0-1 2 12.1-5 12.12 12.14 12.15-2 12.17 15.0-1 2 15.1-8 9, 15.1-11/12 15.4-3 4, 15.11-3, 15.11-5 15.11-6, 15.11-8 thr. 15.11-10, 15.12-1 15.12-4, 15.12-8 15.15 15.16-5 6 15.17 15.21 15.22 16.0-1, 16.9-4, 16.12-5 17.0-1/2 17.1-4 thr. 17.1-6 17.13 17.14 17.17 17.18 17.19	9009	New units added to P-number list and cross reference guide. New systems added in Option Cross Reference Guide. Memory Expansion Board (IMD) added. Ultra 12(F) ESDI Controller added. Additions to Adaptec ACB-2322 and AHA-1542A added. Default strap settings Mitac Hard Disk changed. Eiconcard PC, Ethernet LAN processor ELP eisa (IVB) added. Additions to 1S.1P board, NP500, NI5210, Specialix Host Card, NP600, Network processor (IVA). Modification history added. Panasonic JU-475-3, Panasonic JU-475-4, Epson SMD 340/349 added. Additions to Epson SMD 440, Epson SMD 480.

X	UPD.	SI No.	PAGES AFFECTED	DATE	REMARKS
5	4		18.0-2 18.1-9 thr. 18.1-12 18.27 18.28 18.29 18.30  20.0-1 2 20.1-4 thr. 20.1-10 20.14 20.17 20.18 20.19 20.20 20.21 20.22  21.0-1, 21.9-4, 21.10-4 21.12-4 21.13  23.0-1, 23.1-2 23.3	9009	Micropolis 1588-15, Micropolis 1684-7, Micropolis 1674-7, Seagate ST2383E added.  NMS 1481, NMS 1433, NMS 1439, NMS 1461, NMS 1467, PP402, PP405 added.  Modification history added.  Smartcard PE118 added.
6	5		12.0-1 0-2, 12.1-1 1-2 12.1-5 1-6, 12.18-1 thr. 12.18-6  15.0-1 0-2, 15.1-1 1-2, 15.23-1 thr. 15.23-4, 15.24-1 thr. 15.24-4  17.0-1 0-2, 17.1-1 1-2, 17.1-7 1-8, 17.16-3 16-4 17.19-3 19-4, 17.20-1 thr. 17.20-4  18.0-1 0-2, 18.1-1 1-2, 18.1-9 1-10, 18.23-1 23-2, 18.31-1 thr. 18.31-4, 18.32-1 thr. 18.32-4, 18.33-1 thr. 18.33-4, 18.34-1 thr. 18.34-4	9105	Addition of MYLEX Controller  Addition of Token Card (WS) and NI6510  Addition F.D. PANASONIC JU-257-3P Error Correction  Addition of QUANTUM LPS105 MAXTOR 7080A SEAGATE ST4766E(ESD1) and SEAGATE ST4766N (SCSI)
7	6		12.0-1 0-2, 12.1-1 1-2 12.15-1 2 12.19.1, thr. 12.19.6 15.7.1, thr. 15.7.16 16.0-1 0-2 16.12-5 6 16.13-1 thr. 16.13.4 17.0-1 0-2 17.1-7 8 17.5-1 2 17.18.3 4 17.21.0 thr. 17.21.4 18.0-3 4 18.1-3 thr. 18.1-12 18.20-1 thr. 18.20-4 18.35-1 thr. 18.35-4, 18.36-1 thr. 18.36-4 18.37-1 thr. 18.37-4, 18.38-1 thr. 18.38-4, 18.39-1 thr. 18.39-4,	9203	Addition of Adaptec AHA-1740 Contr Error Correction Adaptec AHA-1740 Error Correction Addition of Cardinal VGA700 Modification history added. Addition of VGA700 video controller Addition of TEAC FD235HF  Error Correction Error Correction TEAC FD235HF Addition of hard disks Error Correction Error Correction SEAGATE ST1144 SEAGATE ST351A X SEAGATE ST1400N CONNER CP-30104 SEAGATE ST2383N



## PREFACE

This manual describes options used in the Philips PC range. It is written in a format intended to provide a common structure throughout all Customer Engineer Manuals. This is of benefit as information of a certain type is now in a set location in any manual (for example DC/LAN Control Units are covered in chapter 15). Chapters 1-9 are covered by the CE manual applicable to the system.

If there is no item for a category for which there is a chapter allocated, then the chapter is omitted and its chapter number reserved for future use. The contents at the front of the manual lists the chapters. Sections and subsections contained in each chapter are listed at the beginning of the chapter. Section 1.1. of each chapter contains an option cross-reference guide, giving information about the system in which the options concerned are supported. There are two major divisions in the manual, their purpose is as follows:-

10 - 16 Device adapters and other controllers contained within the system units (Volume 1).

17 - 24 Devices and peripherals, both internal and external to the system units (Volume 2).

CHAPT 1 - 9 CEM P3101	CHAPT 10 - 24  CEM PC-OPTIONS
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CHAPT 1 - 9 CEM P3200/P3202/P3204/P3400	
CHAPT 1 - 9 CEM P3301	
CHAPT 1 - 9 CEM P3302/P9130/P9160	
CHAPT 1 - 9 CEM P3360/P9135/P9165	
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23	DEVICE ADAPTERS



## NUMBER CROSS REFERENCE LIST

### Memories:

NUMBER	COMMERCIAL 12NC	DESCRIPTION
P3209-812	8705 717 00060	AST RAMPage 286 (2 MB)
P3209-811	8705 717 00011	AST RAMVantage (512 KBytes)
P3309-006	8709 012 00376	High Speed Memory Expansion Board
P3209-042	8705 712 20199	Micron 2 4 MByte Memory Card (MB-28-D)
P3109-809	8705 717 00009	AST RAMPage AT
P3309-009	8705 712 20187	P3302 32 bit 4 MB RAM Expansion Board
P3309-010	8705 712 20188	P3302 32-bit 8 MB RAM Expansion Board
P3209-041	8705 712 20190	Micron Memory Board (MB-28DH) 2 MB
P3309-034	8705 712 30253	Intel 32-bit Memory Board (8 MB)
P9109-006	8700 090 09014	4 MB Memory Expansion Board (IMC)
P9109-007	8700 090 09015	8 MB Memory Expansion Board (IMC)
P9109-009	8700 090 09033	Memory Expansion Board (IMD)

### Disk Control Units:

NUMBER	COMMERCIAL 12NC	DESCRIPTION
CM153.00	9022 511 53009	CM153
P3209-703	8705 712 30251	AT Storage Adapter
P3309-036	8705 712 30250	Adaptec ACB-2322
P9109-013	8700 090 09032	Adaptec ACB-2322D
P3209-043	8705 712 30240	WD1003V-MM2
P9109-005	8700 090 09011	Adaptec AHA-1542B
		Ultra 12(F) ESDI Controller

### DC/LAN Control Units:

NUMBER	COMMERCIAL 12NC	DESCRIPTION
P3109-041	8709 011 00246	PC-COAX Ver. 1B
P3209-008	8702 320 09008	1S/1P <i>507 265 13014</i>
P3109-047	8705 712 30184	ILP
P3109-021	8705 712 30176	IDEA MINICOM
P3109-039	8702 300 09051	LWSI Controller
P3109-037		Serial Parallel (SPB-A)
P3109-054	8705 712 20157	ICP
P3209-018	8705 303 25519	AST Four Port
P3109-132	8705 712 30229	NP500 LAN Controller
P3109-131	8705 712 30238	NI5210 LAN Controller



P3109-027	8705 712 30150	Persyst Multifunction
P3109-061	8705 712 30218	PCOX-COAX
P3209-026	8709 303 30237	Specialix Host Card 1
		Specialix Host Card 2
P3209-060	8705 712 30239	NP600 LAN Controller
P9109-003	8700 090 09001	Network Processor (IVA)
	8705 712 30258	EiconCard (512 KB)
	8705 712 30259	EiconCard (256 KB)
P9109-012	8700 090 09031	Ethernet LAN processor ELP-eisa (IVB)

#### Video Control Units:

NUMBER	COMMERCIAL 12NC	DESCRIPTION
P3109-006	8705 712 30141	Persyst Colour
P3209-010	8705 712 30187	Everex Monochrome
P3209-003	8702 320 09003	Standard Video
P3109-060	8705 712 30199	AST-3G Plus
P3209-010	8705 712 30200	AST Preview
P3109-124	8705 712 20163	ATI Graphics Solution
P3109-125	8705 712 30225	ATI EGA Wonder
P3109-141	8705 712 30235	Paradise OEM6 EGA
P3109-124	8705 712 20163	ATI Small Wonder (Generic)
P3109-124	8705 712 20212	ATI Small Wonder (Danish/Norwegian)
P3109-124	8705 712 20223	ATI Small Wonder (Portuguese)
P3109-142	8705 712 30236	Paradise OEM8 VGA
P3109-104	8705 712 20235	Philips VGA (German)
P3109-104	8705 712 20236	Philips VGA (French)
P3109-104	8705 712 20238	Philips VGA (Dutch)
P3109-104	8705 712 20237	Philips VGA (Swedish)
P3109-104	8705 712 20239	Philips VGA (Spanish)
P3109-104	8705 712 20240	Philips VGA (Italian)
P3109-104	8705 712 20234	Philips VGA (Export)
P3109-104	8705 712 20241	Philips VGA (Portuguese)
P3109-107	8705 712 20243	Philips VGA (Danish)

#### Floppy Disk Drives:

NUMBER	COMMERCIAL 12NC	DESCRIPTION
P3109-126	8705 712 20200	Panasonic JU455-7 (Beige)
P3109-126	8705 712 20230	Panasonic JU455-7 (Grey)
P3209-065	8705 712 20231	NEC 1157C (Grey)
P3209-065	8705 712 20201	Panasonic JU-475-3 (Beige)
P3209-065	8705 712 20231	Panasonic JU-475-3 (Grey)



P3209-064	8705 712 20203	Epson SMD-440L (Beige)
P3209-064	8705 712 20233	Epson SMD-440L (Grey)
P3109-127	8705 712 20204	Epson SMD-480L (Beige)
P3109-127	8705 712 20232	Epson SMD-480L (Grey)
		Epson SMD-340

#### Hard Disk Drives:

NUMBER	COMMERCIAL 12NC	DESCRIPTION
P3109-014		Miniscribe MS3012
P3209-007	8702 320 09007	Miniscribe 6032
P3202-343	8705 721 15182	Miniscribe 6053
P3202-35X		Miniscribe 6085
CM201/00	9022 832 01009	CD-ROM Drive
CM121/00	9022 831 21009	CD-ROM Drive
CM210/00	9022 832 10009	CD-ROM Drive
CM131/00	9022 831 31009	CD-ROM Drive
P3309-027	8705 712 20228	Micropolis 1558-15
P3309-024	8705 712 20227	Micropolis 1654-7
P3109-122	8705 712 20161	Western Digital 93028-A
P3109-148		Western Digital 93028-X
P3109-148	8705 712 20221	Western Digital 93038-X
P3109-149	8705 712 20222	Western Digital 93048-X
P3209-057	8705 712 20246	Seagate ST157A
		Conner Peripherals CP3104
		Conner Peripherals CP3204
P9109-903	8700 090 09023	Micropolis 1664-7
P3209-070		Rodime 3088A
P3209-070	8705 712 20218	Rodime 3128A
P3209-067	8705 712 20206	Miniscribe 8051A
P9109-901	8700 090 09017	Micropolis 1588-15
P9109-902	8700 090 09018	Micropolis 1684-7
P9109-904	8700 090 09028	Micropolis 1674-7
		Seagate ST2383E

#### Tape Drives:

NUMBER	COMMERCIAL 12NC	DESCRIPTION
P3109-721	8705 712 20115	Irwin 110
P3109-046		Archive 5945C
P3309-014	8705 712 20249	Viper 150
P3309-018	8705 712 20197	Viper 2150S

**Printers:**

NUMBER	COMMERCIAL 12NC	DESCRIPTION
NMS 1030/00	8622 520 30009	Epson FX80 +
P2906-503	8705 790 10177	Epson FX85
P2906-601	8700 029 06016	Epson FX800 220V
P2906-602	8700 029 06026	Epson FX800 240V
P2906-603	8700 029 06036	Epson FX800 110V
P2906-701	8700 029 06017	Epson FX850 220V
P2906-702	8700 029 06027	Epson FX850 240V
P2906-703	8700 029 06037	Epson FX850 110V
P2907-601	8700 029 07016	Epson FX1000 220V
P2907-602	8700 029 07026	Epson FX1000 240V
P2907-603	8700 029 07036	Epson FX1000 110V
P2907-701	8700 029 07017	Epson FX1050 220V
P2907-702	8700 029 07027	Epson FX1050 240V
P2907-703	8700 029 07037	Epson FX1050 110V
NMS 1432/20	8622 524 32209	220V Printer
NMS 1432/25	8622 524 32259	240V Printer
NMS 1433/00	8622 524 33009	220V Printer
NMS 1433/05	8622 524 33059	240V Printer
NMS 1439/20	8622 524 39209	220V Printer
NMS 1439/25	8622 524 39259	240V Printer
NMS 1439/26	8622 524 39269	220V Printer (CH)
NMS 1439/28	8622 524 39289	220V Printer (IT, ES, PT)
NMS 1440/20	8622 524 40209	220V Printer
NMS 1440/25	8622 524 40259	240V Printer
NMS 1441/20	8622 524 41209	220V Printer
NMS 1441/25	8622 524 41259	240V Printer
NMS 1443/20	8622 524 43209	220V Printer
NMS 1443/25	8622 524 43259	240V Printer
NMS 1461/20	8622 524 61209	220V Printer
NMS 1461/25	8622 524 61259	240V Printer
NMS 1461/26	8622 524 61269	220V Printer (CH)
NMS 1461/28	8622 524 61289	220V Printer (IT, ES, PT)
NMS 1467/20	8622 524 67209	220V Printer
NMS 1467/25	8622 524 67259	240V Printer
NMS 1467/26	8622 524 67269	220V Printer (CH)
NMS 1467/28	8622 524 67289	220V Printer (IT, ES, PT)
NMS 1480/20	8622 524 80209	220V (Export)
NMS 1480/21	8622 524 80219	220V (Dutch)
NMS 1480/22	8622 524 80229	220V (German)
NMS 1480/24	8622 524 80249	220V (Portuguese)
NMS 1480/25	8622 524 80259	220V (UK)
NMS 1480/28	8622 524 80289	220V (Italian)
NMS 1480/30	8622 524 80309	220V (Belgian)

NMS 1480/36	8622 524 80369	220V (Spanish)
NMS 1480/39	8622 524 80399	220V (French)
NMS 1481/20	8622 524 81209	220V (Export)
NMS 1481/21	8622 524 81219	220V (Dutch)
NMS 1481/22	8622 524 81229	220V (German)
NMS 1481/24	8622 524 81249	220V (Portuguese)
NMS 1481/25	8622 524 81259	220V (UK)
NMS 1481/28	8622 524 81289	220V (Italian)
NMS 1481/30	8622 524 81309	220V (Belgian)
NMS 1481/36	8622 524 81369	220V (Spanish)
NMS 1481/39	8622 524 81399	220V (French)
PP402	8707 290 01001	Printer (EXP, FR, DE, GB)
PP405	8707 240 01001	Printer (EXP, FR, DE, GB)
P2973-001	8700 029 73001	QUME Laser Ten Plus 220V
P2973-002	8700 029 73002	QUME Laser Ten Plus 110V
P2950-001	8709 011 00252	QUME S11/55

#### Visual Display Units:

NUMBER	COMMERCIAL 12NC	DESCRIPTION
P2723-30X		Monochrome (325)
P2725-100	8700 027 25001	Tatung CM-1322P
P2724-301	8705 741 10179	Monochrome (400) 110V
P2724-302	8705 741 10180	Monochrome (400) 220V
P2722-XXX		Monochrome 7BM5X3
P2728-200	8222 900 50129	Sampo Enhanced Colour
P2706-0XX		Terminal
BM7723/00	8603 107 23009	FSQ Monochrome
BM7723/05	8603 107 23059	FSQ Monochrome
BM7723/16	8603 107 23169	FSQ Monochrome
BM7913-00G	8603 109 13003	FSQ Monochrome 220V green phos.
BM7913-05G	8603 109 13053	FSQ Monochrome 240V green phos.
BM7913-16G	8603 109 13163	FSQ Monochrome green phos. (Spanish)
BM7923-00G	8603 109 23003	FSQ Monochrome 220V amber phos.
BM7923-05G	8603 109 23053	FSQ Monochrome 240V amber phos.
BM7923-16G	8603 109 23163	FSQ Monochrome amber phos. (Spanish)
7BM713-00B	8603 117 13001	FSQ Monochrome 220V green phos.
7BM713-05B	8603 117 13051	FSQ Monochrome 240V green phos.
7BM723-00B	8603 117 23001	FSQ Monochrome 220V amber phos.
7BM723-05B	8603 117 23051	FSQ Monochrome 240V amber phos.
7BM743-00B	8603 117 43001	FSQ Monochrome 220V white phos.
CM9053/00	8604 310 53009	FSQ Colour
CM9053/02	8604 310 53029	FSQ Colour
CM9073/00	8604 310 73009	FSQ Colour
CM9073/02	8604 310 73029	FSQ Colour



9CM053-00B	8604 200 53001	FSQ Colour 220V
9CM053-02B	8604 200 53021	FSQ Colour (German)
9CM053-05B	8604 200 53051	FSQ Colour (UK)
9CM053-06B	8604 200 53061	FSQ Colour (Swiss)
9CM073-00B	8604 200 73001	FSQ Colour 220V beige
9CM073-02B	8604 200 73021	FSQ Colour (German)
9CM073-05B	8604 200 73051	FSQ Colour (UK)
9CM073-06B	8604 200 73061	FSQ Colour (Swiss)
CM8833-00G	8603 138 33003	Colour 14" CGA 220V
CM8833-05G	8603 138 33053	Colour 14" CGA GB
CM8833-16G	8603 138 33163	Colour 14" CGA ES
7BM749-00B	8603 117 49001	Monochrome VGA 220V beige
7BM749-00T	8603 117 49006	Monochrome VGA 220V grey
7BM749-05B	8603 117 49051	Monochrome VGA 240V beige
7BM749-05T	8603 117 49056	Monochrome VGA 240V grey
7BM749-06B	8603 117 49061	Monochrome VGA beige (Swiss)
7BM749-06T	8603 117 49066	Monochrome VGA grey (Swiss)
9CM082-00B	8604 200 82001	Colour VGA 220V
9CM082-05B	8604 200 82051	Colour VGA (UK)
9CM082-06B	8604 200 82061	Colour VGA (Swiss)
3CM9809-00B	8641 398 09001	Colour VGA 220V beige
3CM9809-00T	8641 398 09006	Colour VGA 220V grey
3CM9809-05B	8641 398 09051	Colour VGA beige (UK)
3CM9809-05T	8641 398 09056	Colour VGA grey (UK)
3CM9809-06B	8641 398 09061	Colour VGA beige (Swiss)
3CM9809-06T	8641 398 09066	Colour VGA grey (Swiss)
3CM9609-00B	8641 396 09001	Colour VGA 220V beige
3CM9609-00T	8641 396 09006	Colour VGA 220V grey
3CM9609-05B	8641 396 09051	Colour VGA beige (UK)
3CM9609-05T	8641 396 09056	Colour VGA grey (UK)
3CM9609-06B	8641 396 09061	Colour VGA beige (Swiss)
3CM9609-06T	8641 396 09066	Colour VGA grey (Swiss)
8CM852-30B	8603 148 52301	Colour CGA 220V
8CM852-35B	8603 148 52351	Colour CGA (GB)
8CM852-36B	8603 148 52361	Colour CGA (ES)
8CM875-00B	8603 148 75001	Multi-frequency Colour VGA 220V
8CM875-05B	8603 148 75051	Multi-frequency Colour VGA (Swiss)
8CM875-06B	8603 148 75061	Multi-frequency Colour VGA (UK)

#### Keyboards:

NUMBER	COMMERCIAL 12NC	DESCRIPTION
P2812-0XX	8705 751 0XX17	Hi Tek PC/XT
P2813-000		Hi-Tek AT
P2814-0XX		Keytronic

P2806-XXX  
P2815-101 8700 028 15016  
P2815-102 8700 028 15026  
P2815-103 8700 028 15036  
P2815-106 8700 028 15066  
P2815-140 8700 028 15406  
P2815-109 8700 028 15096  
P2815-111 8700 028 15116  
P2815-113 8700 028 15136  
P2815-114 8700 028 15146  
P2815-115 8700 028 15156  
P2815-142 8700 028 15426  
P2815-120 8700 028 15206  
P2815-108 8700 028 15086  
P2815-141 8700 028 15416  
P2815-401 8700 028 15314  
P2815-402 8700 028 15324  
P2815-403 8700 028 15334  
P2815-406 8700 028 15364  
P2815-440 8700 028 15704  
P2815-409 8700 028 15394  
P2815-411 8700 028 15514  
P2815-413 8700 028 15534  
P2815-414 8700 028 15544  
P2815-415 8700 028 15554  
P2815-420 8700 028 15604  
P2815-408 8700 028 15384  
P2814-087 8705 751 00127  
P2814-088 8705 751 00227  
P2814-089 8705 751 00327  
P2814-006 8705 751 00627  
P2814-007 8705 751 00727  
P2814-009 8705 751 00925  
P2814-011 8705 751 01127  
P2814-090 8705 751 01327  
P2814-043 8705 751 01427  
P2814-000 8705 751 01527  
P2814-020 8705 751 02727  
P2814-008 8705 751 03027  
P2814-032 8705 751 03227  
P2814-087G 8705 751 00129  
P2814-088G 8705 751 00229  
P2814-089G 8705 751 00329  
P2814-006G 8705 751 00629  
P2814-007G 8705 751 00729  
P2814-009G 8705 751 00929  
P2814-011G 8705 751 01129

#### Terminal Keyboard

Philips 102-key beige (German)  
Philips 102-key beige (UK)  
Philips 102-key beige (French)  
Philips 102-key beige (Swedish)  
Philips 102-key beige (Belgian)  
Philips 102-key beige (Danish)  
Philips 102-key beige (Norwegian)  
Philips 102-key beige (Spanish)  
Philips 102-key beige (Italian)  
Philips 101-key beige (Export)  
Philips 102-key beige (Arabic/Eng.)  
Philips 102-key beige (Portuguese)  
Philips 102-key beige (Swiss)  
Philips 102-key beige (Greek)  
Philips 102-key grey (German)  
Philips 102-key grey (UK)  
Philips 102-key grey (French)  
Philips 102-key grey (Swedish)  
Philips 102-key grey (Belgian)  
Philips 101-key grey (Danish)  
Philips 102-key grey (Norwegian)  
Philips 102-key grey (Spanish)  
Philips 102-key grey (Italian)  
Philips 102-key grey (Export)  
Philips 102-key grey (Portuguese)  
Philips 102-key grey (Swiss)  
Honeywell 102-key beige (German)  
Honeywell 102-key beige (UK)  
Honeywell 102-key beige (French)  
Honeywell 102-key beige (Swedish)  
Honeywell 102-key beige (Belgian)  
Honeywell 102-key beige (Danish)  
Honeywell 102-key beige (Norwegian)  
Honeywell 102-key beige (Spanish)  
Honeywell 102-key beige (Italian)  
Honeywell 101-key beige (Export)  
Honeywell 102-key beige (Portuguese)  
Honeywell 102-key beige (Swiss)  
Honeywell 102-key beige (Greek)  
Honeywell 102-key grey (German)  
Honeywell 102-key grey (UK)  
Honeywell 102-key grey (French)  
Honeywell 102-key grey (Swedish)  
Honeywell 102-key grey (Belgian)  
Honeywell 102-key grey (Danish)  
Honeywell 102-key grey (Norwegian)

P2814-090G	8705 751 01329	Honeywell 102-key grey (Spanish)
P2814-043G	8705 751 01429	Honeywell 102-key grey (Italian)
P2814-000G	8705 751 01529	Honeywell 101-key grey (Export)
P2814-020G	8705 751 02729	Honeywell 102-key grey (Portuguese)
P2814-008G	8705 751 03029	Honeywell 102-key grey (Swiss)
P2814-032G	8705 751 03229	Honeywell 102-key grey (Greek)

**Device Adapters:**

NUMBER	COMMERCIAL 12NC	DESCRIPTION
P3060-221	8702 493 33531	Microsoft Bus Mouse
PE118-102	8709 011 02164	Smartcard Reader (without PSMC)
PE118-112	8709 011 02165	Smartcard Reader (with PSMC)



## OPTION BOARD CROSS-REFERENCE GUIDE

These tables list the option boards included in this manual, and detail their relevant I/O addresses, interrupt and DMA assignments. In systems which are ATs or AT compatible, IRQ2 is sensed via the IRQ9 input.

### Memories

BOARD TYPE	I/O ADDRESS		INTERRUPT		DMA CHANNEL		MEMORY
	Standard	Alternative	Stand.	Altern.	Stand.	Altern.	
AST RAMpage 286	02x8, 02x9, 42x8, 42x9, 82x8, 82x9, C2x8	02x8, 02x9, 42x8, 42x9, 82x8, 82x9, C2x8 x = 0, 1, 5, 6, A, B, E, strap selectable					80000-200000 start address selectable
AST RAM Vantage							80000-300000 start address selectable
HMB Board							140000
Micron MB-28-D							100000-E00000
AST RAMpage AT	02x8, 02x9, 42x8, 42x9, 82x3, 82x9, C2x8	02x8, 02x9, 42x8, 42x9, 82x8, 82x9, C2x8 x = 0, 1, 5, 6, A, B, E, strap selectable					80000-200000 start address selectable
4/8 Mbyte Memory Board							200000-C00000
4/8 Mbyte Memory Expansion Board (IMC)							200000-C00000 start address selectable
Memory Expansion Board (IMD)							Always starts from zero.

# Disk Control Units

BOARD TYPE	I/O ADDRESS		INTERRUPT		DMA CHANNEL		MEMORY
	Standard	Alternative	Stand.	Altern.	Stand.	Altern.	
<b>WD1002S-WX2</b> <b>WD1002S-WX2A</b> <b>WD1002A-WX1</b>	320-323	324-327	IRQ5	IRQ2	DRQ3		
<b>WD1002-WA2</b> <b>WD1003-WA2</b> <b>WD1003A-WA2</b>							
Hard Disk Function	1F0-1F7 3F6-3F7	170-177 376-377	IRQ14				
Floppy Disk Function	3F2, 3F4-3F5 3F7		IRQ6		DRQ2		
<b>WD1003V-SM2</b> <b>WD1003V-MM2</b>							
Hard Disk Function	1F0-1F7 3F6-3F7	170-177 376-377	IRQ14				
Floppy Disk Function	3F2, 3F4-3F5, 3F7	372, 374-375 377	IRQ6		DRQ2		
<b>XT Storage Adapter</b>	320-323		IRQ5		DRQ3		
<b>AT Storage Adapter</b>							
Hard Disk Function	1F0-1F7 3F6-3F7	170-177 376-377	IRQ14				
Floppy Disk Function	3F2, 3F4-3F5, 3F7		IRQ6		DRQ2		
<b>Adaptec ACB-2322X</b>							
Hard Disk Function	1F0-1F7 3F6-3F7	170-177 376-377	IRQ14	IRQ10, 11, 12 or 15			C8000 or CC000
Floppy Disk Function	3F2, 3F4-3F5, 3F7	372, 374-375 377	IRQ6	IRQ10	DRQ2	DRQ3	
<b>Adaptec AHA-1542X</b>							
Hard Disk Function	330	130, 134, 230, 234, 334	IRQ11	IRQ9, 10, 12, 14 or 15	DRQ5	DRQ0, 6 or 7	C8000, CC000, D8000 or DC000
Floppy Disk Function	3F2, 3F4-3F5, 3F7	372, 374-375 377	IRQ6	IRQ10	DRQ2	DRQ3	
<b>Mitac Hard Disk Adapter</b>	1F0-1F7		IRQ14				
<b>CM153 CD-ROM Controller</b>	340	300, 310 or 330			DRQ3		

BOARD TYPE	I/O ADDRESS		INTERRUPT		DMA CHANNEL		MEMORY
	Standard	Alternative	Stand.	Altern.	Stand.	Altern.	
Ultra 12(F) ESDI Contr.							
Hard Disk Function	1F0-1F7	170-177	IRQ14	IRQ15			C8000, CC000, D0000, D4000, D8000, DC000
Floppy Disk Function	3F0-3F7	370-377					

# Tape Control Units

BOARD TYPE	I/O ADDRESS		INTERRUPT		DMA CHANNEL		MEMORY
	Standard	Alternative	Stand.	Altern.	Stand.	Altern.	
Archive SC499	200-207	000-007 up to 3F8-3FF	IRQ5	IRQ2, 3, 4, 6 or 7	DRQ1	DRQ2 or 3	
Archive SC499R	200-207	000-007 up to 7F8-7FF	IRQ5	IRQ2, 3, 4, 6 or 7	DRQ1	DRQ2 or 3	
Archive SC402	200-207	000-007 up to 7F8-7FF	IRQ5	IRQ1, 3, 4, 6, 7 or 9	DRQ1	DRQ2 or 3	



# DC/LAN Control Units

BOARD TYPE	I/O ADDRESS		INTERRUPT		DMA CHANNEL		MEMORY
	Standard	Alternative	Stand.	Altern.	Stand.	Altern.	
PC-COAX Ver 1A and 1B	2EE-2FF	220-227 or 3EE-3FF			DRQ1	DRQ3	
1S1P							
Serial Port	3F8-3FF	2F8-2FF	IRQ4	IRQ3			
Parallel Port	378-37A	278-27A	IRQ7	IRQ5			
ILP	364-367	36C-36F	IRQ2	IRQ3			D0000 or E0000
IDEA Minicom	380-383	390-393	IRQ2	IRQ7	DRQ1	DRQ3	
LWSI Controller	IRQ2	IRQ3, 5 or 7					80000-83FFF up to F8000-FBFFF
SPA-B							
Serial Port	3F8-3FF	2F8-2FF	IRQ4	IRQ3			
Parallel Port	378-37A	278-27A	IRQ7	IRQ5			
ICP	350	354, 358 or 35C	IRQ3	IRQ2			C8000 D0000 D8000 or E8000
AST Four Port							
Enhanced Mode Channel 1	2A0-2A7	1A0-1A7	IRQ2, 3, 4, 5, 6 and 7 (shared for all chnls)				
Channel 2	2A8-2AF	1A8-1AF					
Channel 3	1B0-1B7	2B0-2B7					
Channel 4	1B8-1BE	2B8-2BE					
Compatible Mode Channel 1	3F8-3FF	2F8-2FF	IRQ4				
Channel 2	2F8-2FF	3F8-3FF	IRQ3				
Channel 3	1B0-1B7	2B0-2B7	IRQ2, 3, 4, 5, 6 or 7, shared				
Channel 4	1B8-1BE	2B8-2BE					
NP500	360-36F	200-20F up to 3F0-3FF	IRQ3	IRQ5, 9, 11 and 15	DRQ7	DRQ1, 3 and 5	C0000 up to E8000
NI5210	360-367	200-207 up to 3F8-3FF	IRQ2	IRQ3, 4, 5, 6 or 7			C0000 up to EC000

BOARD TYPE	I/O ADDRESS		INTERRUPT		DMA CHANNEL		MEMORY
	Standard	Alternative	Stand.	Altern.	Stand.	Altern.	
<b>Persyst Multifunction</b>							
Serial Port	3F8-3FF	2F8-2FF	IRQ4	IRQ2, 3 or 5			
Parallel Port	378-37A	278-27A	IRQ7	IRQ5			
Clock Calendar	350	250					
<b>PCOX-COAX</b>	220-22F	620-62F A20-A2F or E20-E2F			DRQ1	DRQ3	
<b>Specialix SI Host Card I/O Controller (Revision 1)</b>			IRQ15	IRQ11 or 12			D0000-DFFFF or DE0000- DEFFFF
<b>Specialix SI Host Card I/O Controller (Revision 2)</b>			IRQ15	IRQ11 or 12			
<b>NP600</b>	300-307	200-207 up to 3F8-3FF	IRQ3	IRQ5, 9, 11 or 15	DRQ1	DRQ3, 5 or 7	
<b>Network Processor (IVA)</b>	240-24F	000-00F up to 3F0-3FF	IRQ12	IRQ7, 11, 14 or 15	DRQ6	DRQ5 or 7	
<b>3C501 LAN Controller</b>	300-30F	000-00F up to 3F0-3FF	IRQ3	IRQ2, 4, 5, 6 or 7			00000 up to FF000
<b>NE1000 LAN Controller</b>	300	320, 340 or 360	IRQ3	IRQ2, 4 or 5			C8000 CC000 or D4000
<b>NE2000 LAN Controller</b>	300	320, 340 or 360	IRQ3	IRQ2, 4 or 5			C8000 CC000 or D4000
<b>EICONCARD/PC</b>	380	278, 280, 378, 388, 390, 398, 678, 680, 778, 780, 788, 790, 798		IRQ2, 3, 4, 5, 6, 7			
<b>Ethernet Lan Processor ELP/eisa (IVB)</b>	SC8D (S = slotno.)			IRQ7, 9, 10, 11, 14			



# Video Control Units

BOARD TYPE	I/O ADDRESS		INTERRUPT		DMA CHANNEL		MEMORY
	Standard	Alternative	Stand.	Altern.	Stand.	Altern.	
<b>PERSYST</b>	3D0-3DF						B8000-BFFFF
<b>EVEREX</b>							
Monochrome HGC 32K HGC 64K	3B4-3BB 3B4-3BB 3B4-3BB						B0000-B1FFF B0000-B7FFF B0000-BFFFF
Printer Port	3BC-3BE		IRQ7				
<b>STANDARD Video</b>							
Monochrome Colour CGA	3B4-3BF 3D0-3DF						B0000-B3FFF B8000-BFFFF
<b>AST-3G Plus</b>							
Standard I/O, BIOS	3C0-3CF	2C0-2CF	IRQ2				C0000-C3FFF
Monochrome various modes HGC 32K HGC 64K	3B0-3BB 3B0-3BB 3B0-3BB						A0000-BFFFF B0000-B7FFF B0000-BFFFF
Colour CGA EGA	3D0-3DF 3D0-3DF						B8000-BFFFF A0000-BFFFF
Printer Port	3BC-3BE	378-37A	IRQ7	IRQ5			
<b>AST Preview</b>							
Monochrome MDA HGC 32K HGC 64K	3B4-3BB 3B4-3BB 3B4-3BB						B0000-B0FFF B0000-B7FFF B0000-BFFFF
Printer Port	3BC-3BE		IRQ7				
<b>ATI Graphics Solution</b>							
Monochrome MDA HGC 32K HGC 64K	3B0-3BF 3B0-3BF 3B0-3BF						B0000-B0FFF B0000-B7FFF B0000-BFFFF
Colour CGA Plantronics ATI High Resolution	3D0-3DF 3D0-3DF 3D0-3DF						B8000-BFFFF B8000-BFFFF B0000-BFFFF
<b>ATI EGA Wonder</b>							
Standard IO, BIOS	3C0-3CF	2C0-2CF	IRQ2				C0000-C3FFF
Monochrome various modes HGC 32K HGC 64K	3B0-3BF 3B0-3BF 3B0-3BF						A0000-BFFFF B0000-B7FFF B0000-BFFFF
Colour CGA EGA VGA	3D0-3DF 3D0-3DF 3D0-3DF						B8000-BFFFF A0000-BFFFF A0000-BFFFF

BOARD TYPE	I/O ADDRESS		INTERRUPT		DMA CHANNEL		MEMORY
	Standard	Alternative	Stand.	Altern.	Stand.	Altern.	
<b>Paradise OEM 6 EGA</b>							
Standard IO, BIOS	3C0-3CF	2C0-2CF					C0000-C3FFF
Monochrome - various modes - HGC 32K - HGC 64K	3B0-3BF 3B0-3BF 3B0-3BF						A0000-BFFFF B0000-B7FFF B0000-BFFFF
Colour - CGA - Plantronics - EGA - Multisync	3D0-3DF 3D0-3DF 3D0-3DF 3D0-3DF						B8000-BFFFF B8000-BFFFF A0000-BFFFF A0000-BFFFF
<b>ATI Small Wonder</b>							
Monochrome - MDA - HGC 32K - HGC 64K	3B0-3BF 3B0-3BF 3B0-3BF						B0000-B0FFF B0000-B7FFF B0000-BFFFF
Colour - CGA - Plantronics - ATI High Resolution	3D0-3DF 3D0-3DF 3D0-3DF						B8000-BFFFF B8000-BFFFF B0000-BFFFF
<b>Paradise OEM 8 VGA</b>							
Standard IO, BIOS	3C0-3CF						C0000-C7FFF
Monochrome - various modes - HGC 32K - HGC 64K	3B0-3BF 3B0-3BF 3B0-3BF						A0000-BFFFF B0000-B7FFF B0000-BFFFF
Colour - CGA - Plantronics - EGA - VGA	3D0-3DF 3D0-3DF 3D0-3DF 3D0-3DF						B8000-BFFFF B8000-BFFFF A0000-BFFFF A0000-BFFFF
<b>Philips VGA451</b>							
Standard IO, BIOS	3C0-3CF 100-102 46E8 *			IRQ2			C0000-C7FFF
Monochrome - various modes - HGC 32K - HGC 64K	3B0-3BF 3B0-3BF 3B0-3BF						A0000-BFFFF B0000-B7FFF B0000-BFFFF
Colour - CGA - Plantronics - EGA - VGA	3D0-3DF 3D0-3DF 3D0-3DF 3D0-3DF						B8000-BFFFF B8000-BFFFF A0000-BFFFF A0000-BFFFF

\* Most I/O cards only use the lower 10 addresslines for I/O decoding. To these I/O cards 46E8 is seen as 2E8. This address is also used by the ARCNET card. Strap the ARCNET card for another I/O address.

## Device Adapters

BOARD TYPE	I/O ADDRESS		INTERRUPT		DMA CHANNEL		MEMORY
	Standard	Alternative	Stand.	Altern.	Stand.	Altern.	
<b>Bus Mouse Card</b>	23C-23F	238-23B	IRQ2	IRQ3. 4, 5			
<b>Smartcard Reader PE118</b> - Interface 1	3E8	2E8, 2F8, 3F8	NONE	IRQ3, 4			
- Interface 2	320	328, 330, 338	NONE	IRQ3, 4, 5, 7, 9			





## 10. MEMORIES

Section:

Page:

1 : Technical Overview	10.1-1
1.1: Option Cross Reference Guide	10.1-1
1.2: Technical Data	10.1-2

2: AST RAMPage 286	10.2-1	n.a.	10.2-2	n.a.	10.2-5	n.a.
3: AST RAM Vantage	10.3-1	10.3-2	10.3-2	n.a.	10.3-7	n.a.
4: High-speed memory <i>over</i> expansion board (HMB)	10.4-1	n.a.	10.4-2	n.a.	10.4-4	n.a.
5: Micron 2 / 4MB Memory Card (MB-28-D) <i>16 bit</i>	10.5-1	n.a.	10.5-2	10.5-6	10.5-6	n.a.
6: AST RAMPage AT	10.6-1	n.a.	10.6-2	n.a.	10.6-8	n.a.
7: 4 / 8 MB Memory Board (32-bit) <i>Intel</i>	10.7-1	10.7-1	10.7-2	n.a.	10.7-3	n.a.
8: Micron MB-28-DH <i>add-on</i>	10.8-1	n.a.	10.8-2	n.a.	10.8-2	n.a.
9: Intel 32-bit Memory Board	10.9-1	10.9-1	10.9-3	n.a.	10.9-3	n.a.
10: 4/8 MB Memory <i>for 116</i> Expansion Board (IMC)	10.10-1	n.a.	10.10-2	n.a.	10.10-3	n.a.
11: Memory Expansion Board (IMD)	10.11-1	n.a.	n.a.	n.a.	10.11-1	n.a.

*Intel Above*  
*SBI multi → 15.13*

Subsection:	
1 Characteristics	↑
2 Connections	↑
3 Strap Settings / Adjustments	↑
4 Modification History	↑
5 Installation / Maintenance	↑
6 Diagnostic Functions	↑

**NOTE:** n.a. means that this section is not available for this unit.



## 10.1. TECHNICAL OVERVIEW

### 10.1.1. Option Cross Reference Guide

OPTION	P 2 1 2 0	P 2 2 3 0	A V E N G	P31xx				P32xx				P33xx							P 3 4 6 4	P 3 4 0 0	P91xx				
				0	0	0	2	0	0	0	3	0	0	4	4	5	6	7			3	3	6	6	7
				I	I	I	I	I	I	I	I	I	I	I	I	I	I	I			0	5	0	5	0
2: AST RAMPAGE 286								X	X	X	X														
3: AST RAM Vantage								X	X	X									X						
4: High-speed Memory Expansion Board (HMB)												X													
5: Micron 2 / 4MB 16-bit Memory Card (MB-28-D)												X							X	X					
6: AST RAMPAGE AT <sub>16</sub>								X	X											X					
7: 4 / 8 MB Memory Board (32-bit) / <sub>16</sub>												X								X		X			
8: Micron MB-28-DH									X																
9: Intel 32-bit Memory Board														X		X					X	X			
10: 4.8 MB Memory Board (IMC)												X								X		X			
11: Memory Expansion Board (IMD)																		X						X	



### 10.1.2. Technical Data

Specification	AST RAMPage 286	AST RAM VANTAGE	HMB	MICRON MB-28-D
Memory size	512KB-2MB	512KB-3MB	2MB-8MB	2-4MB
RAM chips	256K1	256K1	256K4	
RAM access time	120 (ns)	120 (ns)	100 (ns)	
I/O Address	02x8, 02x9 42x8, 42x9 82x8, 82x9 C2x8, C2x9 x = 0,1,5,6,A,B,E		100	
+ 5V dc Power (A)				2.2
Operating temp.				10°C..50°C
Non-Oper.temp.				-40°C..110°C
Humidity				80% Maximum (Non- Condensing)
Dimensions (mm)				336 x 110

Specification	AST RAMPage AT	4 / 8 MB MEMORY BOARD (32-bit)	MICRON MB-28-DH	INTEL 32-BIT
Memory size	2MB	4 - 8MB	2 MB	8 MB
RAM chips	256K1	1M1	256K1	1M1
RAM access time	120 (ns)	100 (ns)	100 or 120 ns	100 ns
I/O Address (Hex)	02x8, 02x9 42x8, 42x9 82x8, 82x9 C2x8, C2x9 x = 0,1,5,6,A,B,E			
Memory Start Address (Hex)		200000 400000 600000 800000 A00000 C00000		
+ 5V dc Power (A)			1.8	
Dimensions (mm)			336x110	336x110

Specification	IMC Board	IMD Board
Memory size	4 8 MB	minimal 2 MB maximal 64 MB
RAM chips	1M1	SIMMs: 1-4 pair of 1 MB 1-4 pair of 2 MB 1-4 pair of 4 MB 1-4 pair of 8 MB
RAM access time		one Longword: > 80 nSec < 200 nSec 4 Longwords: > 200 nSec < 320 nSec
I/O Address (Hex)		
Memory Start Address (Hex)	200000 400000 600000 800000 A00000 C00000	always from zero
+ 5V dc Power (A)		
Dimensions (mm)		



TITLE: STANDARDS BOOK FOR PURCHASING AND DESIGN REQUIREMENTS

VOLUME: 01 Preferred Components

SECTION: 1.0 (Integrated Circuits)

SUBSECTION: 1.8 RAMS

S 0001

12 N/C	DESCRIPTION	PHILIPS CODE #	MANUF.	P/N	COMMENTS	USED ON
5107-259-9050	Dynamic 200ns 64K x 1		T.I.	4164-20J	7	C1
		9337-082-90682	Mot.	TMS4164Z20NL		
			Mostek	MCM6665AP20	7	
			Fujitsu	MK4564N-20	7	
		9336-408-60682	NEC	MB8264-20	7	
			Hit.	UPD4164C-2	7	
			Mit.	HM4864P3	7	
				M5K4164NP-20	7	
5107-259-8361	Dynamic 150ns 64K x 1	9336-918-20682	Mot.	MCM6665AP15	7	
			Mostek	MK4564N-15	7	
			Fujitsu	MB8264-15	7	
		HM4864P-3	NEC	UPD4164C-15	7	
			Hit.	HM4864P2	7	
			Mit.	M5K4164NP-15	7	
5107-259-8342	Dynamic 120ns 64K x 1		Mot.	MCM6665AP12	7	PCP
			Fujitsu	MB8264A-12	7	Swift
			Mit.	M5K4164NP-12	7	P3101
5107-259-8056	DRAM 256K x 1 150ns (Nibble Mode)		NEC	UPD41257C-15	7	MS00, P3102
			T.I.	TMS4257-15NL	7	EPX
			Mit.	M5M4257P-15	7	
5107-002-0111	DRAM 256K x 1 120ns (Page Mode)		T.I.	TMS4256-12	D	P3202
			Fujitsu	MB81256-12	D	
			Micr.Tech	MT1259-12		
5107-002-0160	Memory Module 64K x 9-120ns Leadless 30 pins SIMM		T.I.	TM4164FM9-12L		P3202
5107-002-0149	Memory Module 256K x 9-150ns Leaded		T.I.	TM4256EL9-15		ICP
			Mit.	MM25609JA-15		
5107-002-0116	Memory Module 256K x 9-120ns Leadless 30pins SIMM		T.I.	TM4256GU9-12	D	P3202
			Mit.	MM25609J-12	D	
			Micr.Tech	MT9259-12	3	
5107-002-0170	Memory Module 256K x 9-120ns Leadless 30pins SIMM		T.I.	TM4256GU9-15		ICP
			Mit.	MM25609J-15		

890103 Mit. MM25609 BJ geeft problemen (Bruntink 3496)

M. PARNIANI  
870202

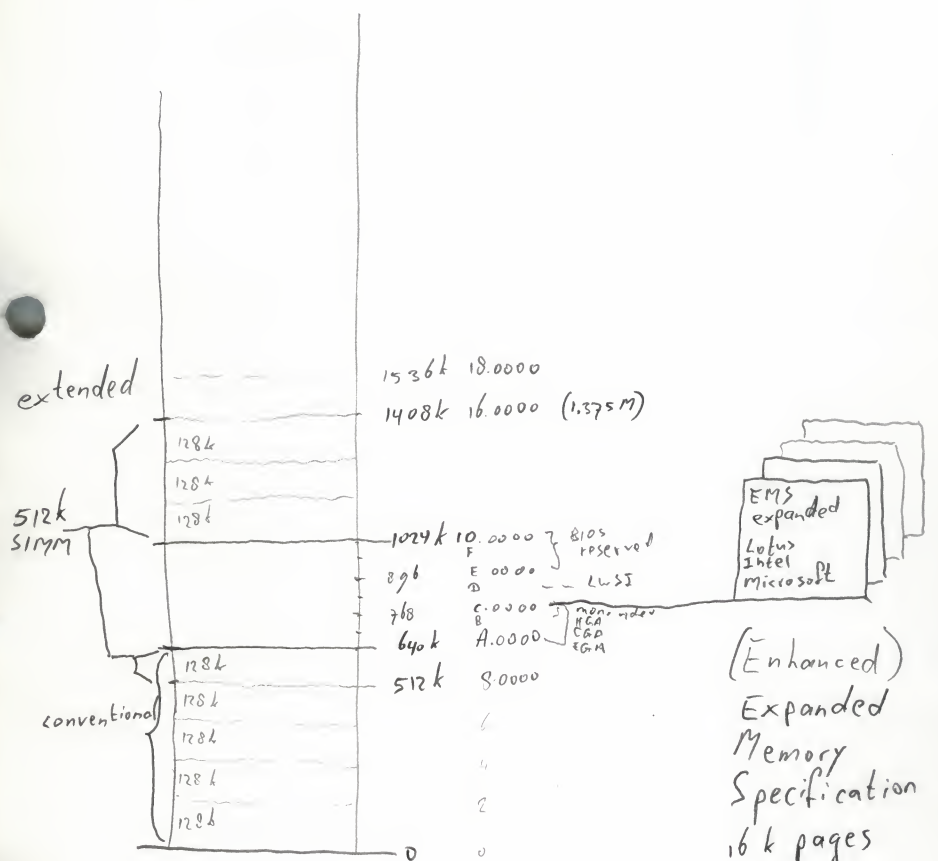
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3/3



Main body of handwritten text, appearing to be a list or series of entries, possibly related to a botanical or scientific study. The text is faint and difficult to read.





(Enhanced)  
Expanded  
Memory  
Specification  
16 k pages  
128k EEMS  
EMS V4.00



This specification explains interfacing user-written programs with the Enhanced Expanded Memory Manager (EEMM) so that the PC processor can access *expanded memory* above the traditional 640 kilobytes (KB) of user-allocated memory. The EEMM is a set of standard interface routines that allow programs running on IBM® PCs, PC-XTs, PC-ATs, or IBM-compatibles to access up to 8-megabytes (MB) of expanded memory. This Enhanced Expanded Memory Specification (EEMS) is fully compatible with the Lotus/Intel/Microsoft Expanded Memory Specification (LIM EMS), but it also offers additional functions and capabilities.

The maximum directly addressable memory in the IBM PC is 1 MB — 640 KB allocated to random access memory (RAM) and an additional 360 KB containing area reserved for read-only memory (ROM), video buffers, and storage for permanent programs and drivers. The amount of addressable memory is a function of the Intel 8088 and 8086 microprocessors as central processing units (CPUs). These microprocessors allow operating systems and programs to directly access up to 1 MB of address space. The PC Disk Operating System (DOS), the most popular PC operating system, generally allows applications programs to access up to a maximum of 640 KB.

Although the IBM PC-AT and AT-compatibles use the more recent 80286 Intel microprocessor (which allows access of up to 16 MB of memory in Protected Virtual Address mode), this microprocessor must currently run in Real mode when running DOS-based applications. In Real mode, the 80286 only allows programs or operating systems to directly access up to 1 MB of address space. As a result, DOS-based applications are still limited to 640 KB of usable memory.

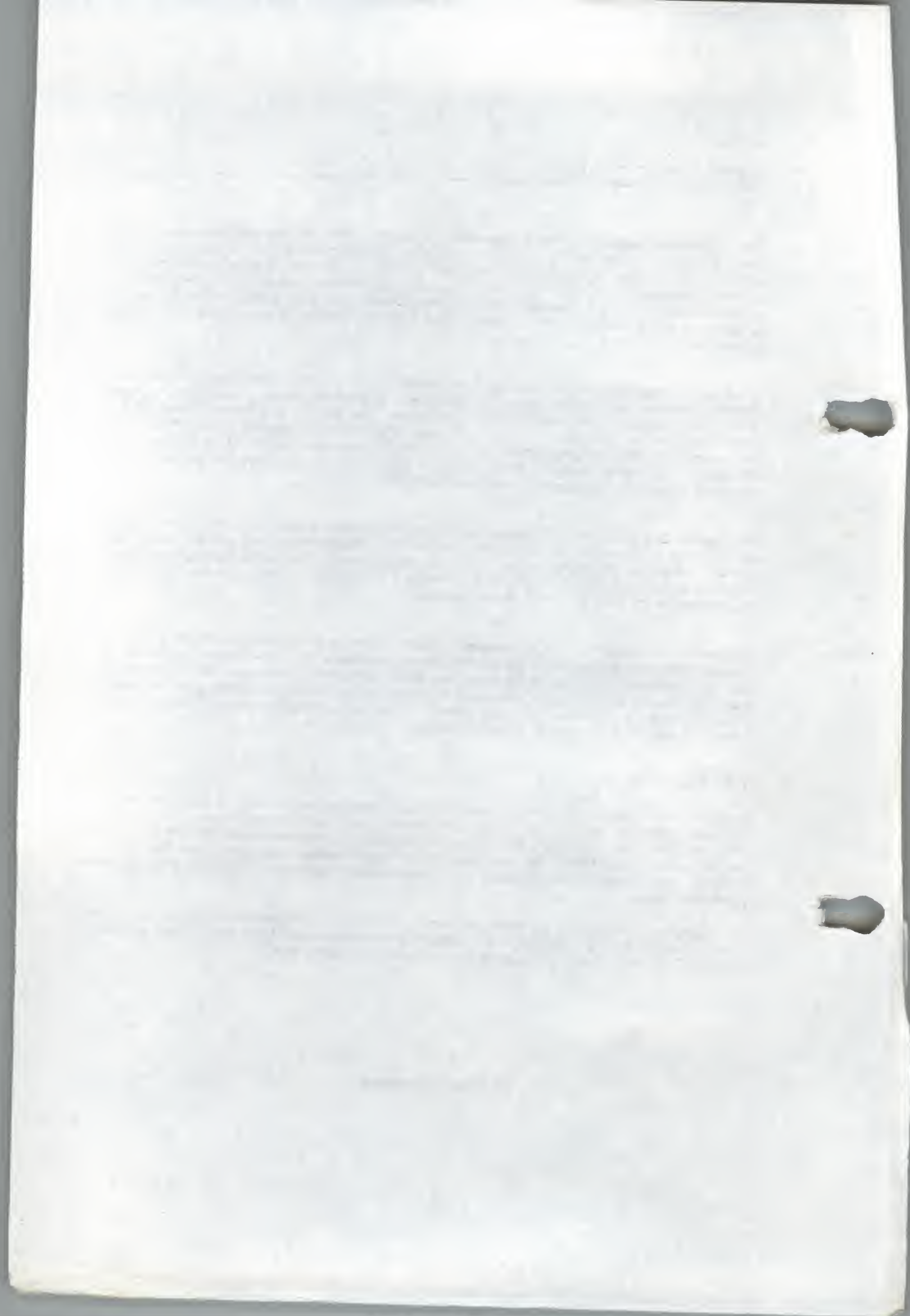
Because several of the most popular business programs require large amounts of memory for program code and data storage; because of the popularity of memory-resident productivity tools; and because of user needs for multitasking plus various other reasons, the 1-MB memory limitation with its 640-KB RAM space has become constraining for many users. To overcome this limitation, the EEMS provides a means of memory *paging* (or *bank switching*) that allows the PC processor to access memory outside the 1-MB range. This paged memory is called *expanded memory*.

### 1.1 Expanded Memory

In order for the *paging* technique to be used, a specially designed plug-in card (the expanded memory card) and a software *device driver* (the expanded memory manager) must be resident in the PC. The expanded memory card contains additional banks of memory capable of being either inside or outside the normal memory map of the PC. The expanded memory manager device driver is a program loaded into a protected area of memory which acts as an interface between applications programs, DOS, and the expanded memory.

The *paging* technique used in PC expanded memory specifications involves accessing the logical and physical memory in 16-KB blocks. In the PC logical memory address space, these 16-KB blocks are called *windows*. The 16-KB blocks of physical memory on the card are called *pages*.





The PC windows are the medium through which the CPU sees the physical pages of expanded memory. That is, specific 16-KB windows in the PC logical memory space can be set up with pointers to physical pages of expanded memory. This scheme is called *memory mapping*. Those physical pages are then mapped in and out of the window space. The *logical* address simply refers or points to a *physical* address which resides in expanded memory. Figure 1-1 illustrates this concept.

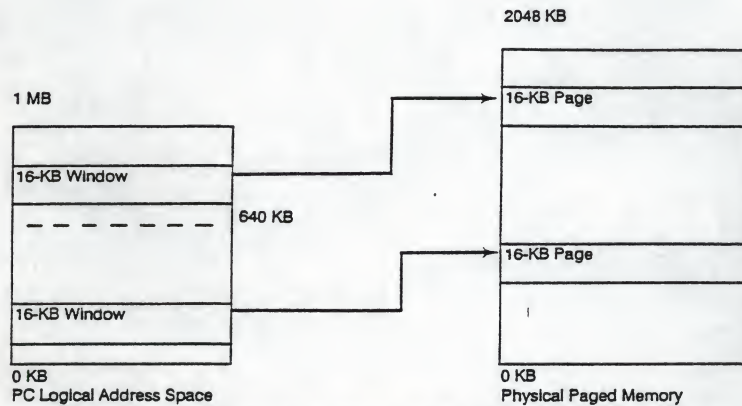


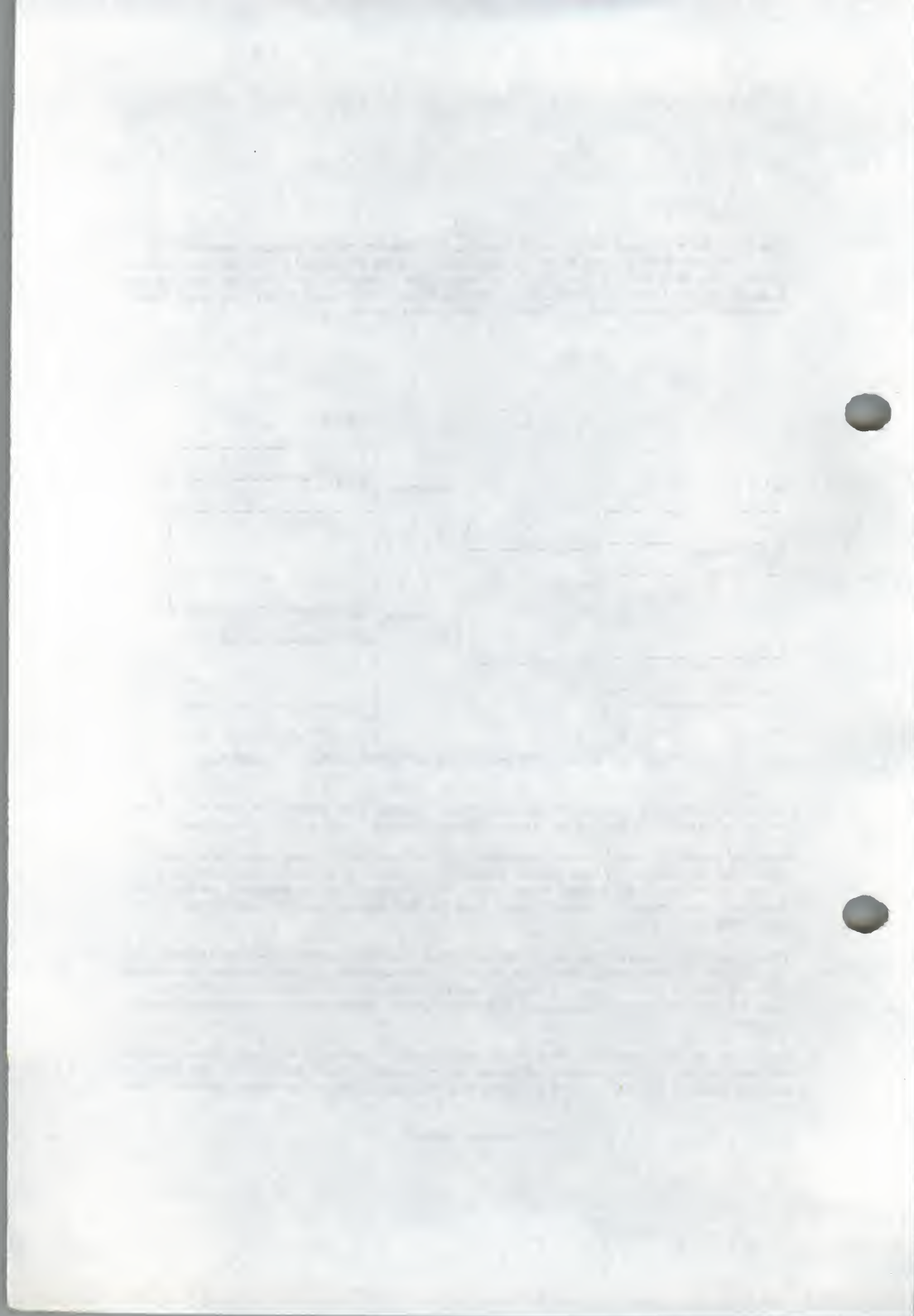
Figure 1-1. Basic EEMS Design: Logical Window Points to Physical Page.

The EEMS allows the PC logical memory to be divided into 64 16-KB windows ( $64 \times 16 \text{ KB} = 1 \text{ MB}$ ), through which up to 512 16-KB pages of expanded physical memory (up to 8 MB) can be accessed.

When any application needs to access data that is physically stored in expanded memory, it accesses that data through a *window*. The hardware that enables the software to map the data through the window is located on the expanded memory board itself. *Page Registers* on the expanded memory board temporarily store information regarding which page (or 16-KB bank) of memory is active and to which window that page is mapped.

When the application and EEMS require a different page in expanded memory, the window's register must be changed to activate the new 16-KB page or a new window accessed. Updating the page registers and moving to different physical pages of memory is called *context switching*. Basically, in multitasking, the *context* is the information that constitutes the identification and running environment of a specific task (or program).

The context for one program may be such that several logical windows are mapped to several physical addresses (pages) and are uniquely associated with that program. Each program that runs must be assigned a *Handle* (referred to in the 3.0 EEMS as a *Process ID*) which is the unique identifier of that





program. Whenever a context switch is made, the current information is saved or stored so that when that context is to be restored, the information is intact.

For example in Figure 1-2, program A requires physical pages of expanded memory which are mapped through the specific logical windows - 1, 2, and 3 in the PC address space. When a context switch occurs, program B now uses the same logical windows to map to *different* physical pages in expanded memory. The mapping information for program A must, however, be safely stored away so that when the context for program A is restored, the correct mapping occurs. The ability to correctly store the information and map the data rests with the memory manager software, which is the key to efficient use of expanded memory.

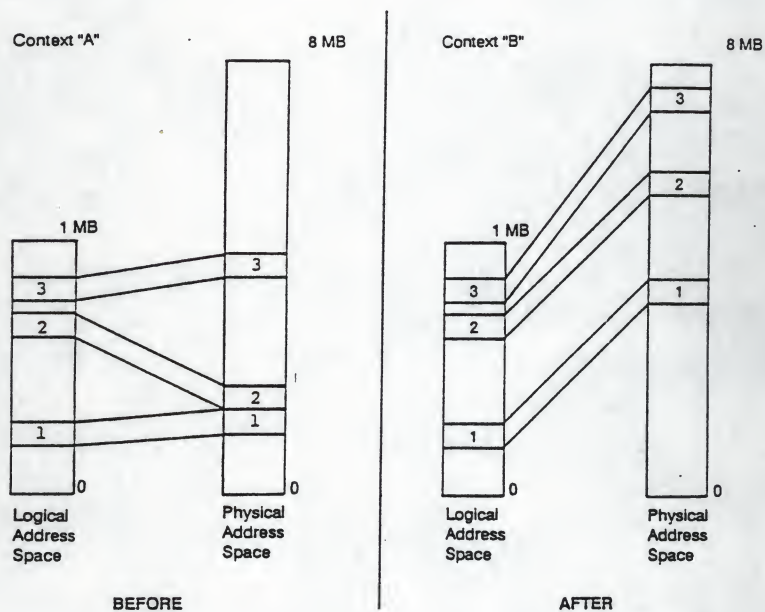
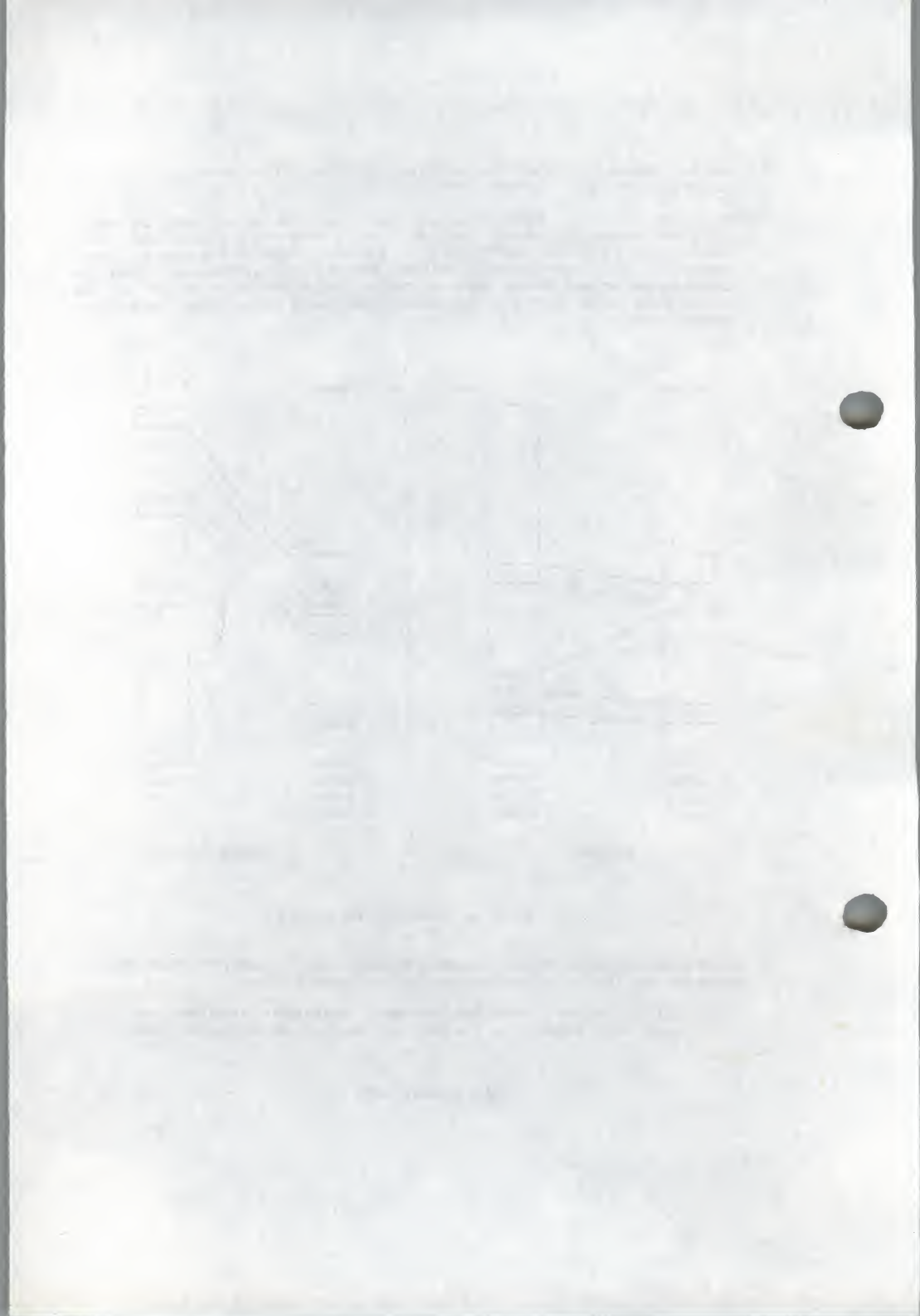


Figure 1-2. Context Switching Example.

With the expanded memory manager device driver, expanded (or paged) memory can be used in one of two general ways - for RAM disks and print spoolers or for applications software.

**RAM Disks and Print Spoolers** - Paged memory can easily be used for a RAM disk or print spooler, leaving the 640-KB user area free for other uses. In this use, the expanded memory





functions like any other RAM disk drive or print spooler storage area. An applications program, for example, does not need to be aware of the extra memory at all.

**Applications Software** – Applications programs that are specifically written to use paged memory are able to manipulate larger amounts of data. With programs that use the paging capability, the PC can accommodate larger spreadsheets and data bases, and more memory-resident data than ever before. Also, with appropriate EEMS hardware and software, multiple large applications programs can be executed concurrently.

Specially written expanded memory applications programs of all types must work hand-in-hand with the device driver that allows the program to access the paged memory. Regardless of how the expanded memory is used, the device driver must keep track of what is stored where and must be able to shuffle the data in and out of the page windows as needed. For example, in the case of spreadsheet data stored in 500 KB of expanded memory, the device driver must retrieve the data in 16-KB pieces (pages) as needed, moving it in and out of the PC's normal addressing area where it can be manipulated as you edit, delete, or add data. The moving and storing occurs at RAM speeds and is transparent to the user.

The functions described in Section 4 of this document constitute the Enhanced Expanded Memory Specification itself. The use of this specification is the means through which programmers can create applications and other routines that effectively use EEMS paged memory. After an explanation of terms, the remaining sections in this document assume that you are technically familiar with paging and expanded memory.

For developers of cache-based accelerator cards, an overview of one implementation of a Generic Accelerator Card Driver (GACD) (which uses reserved function 34) is included as Appendix A. For full implementation details, refer to the *Generic Accelerator Card Driver Specification*, which is available from AST Research.

## 1.2 Explanation of Terms

You should be aware of the meaning of the following terms in this document.

### Conventional memory

Within the 1-MB PC memory space, the lower 640 KB recognized by DOS and used by existing applications programs is referred to as conventional memory.

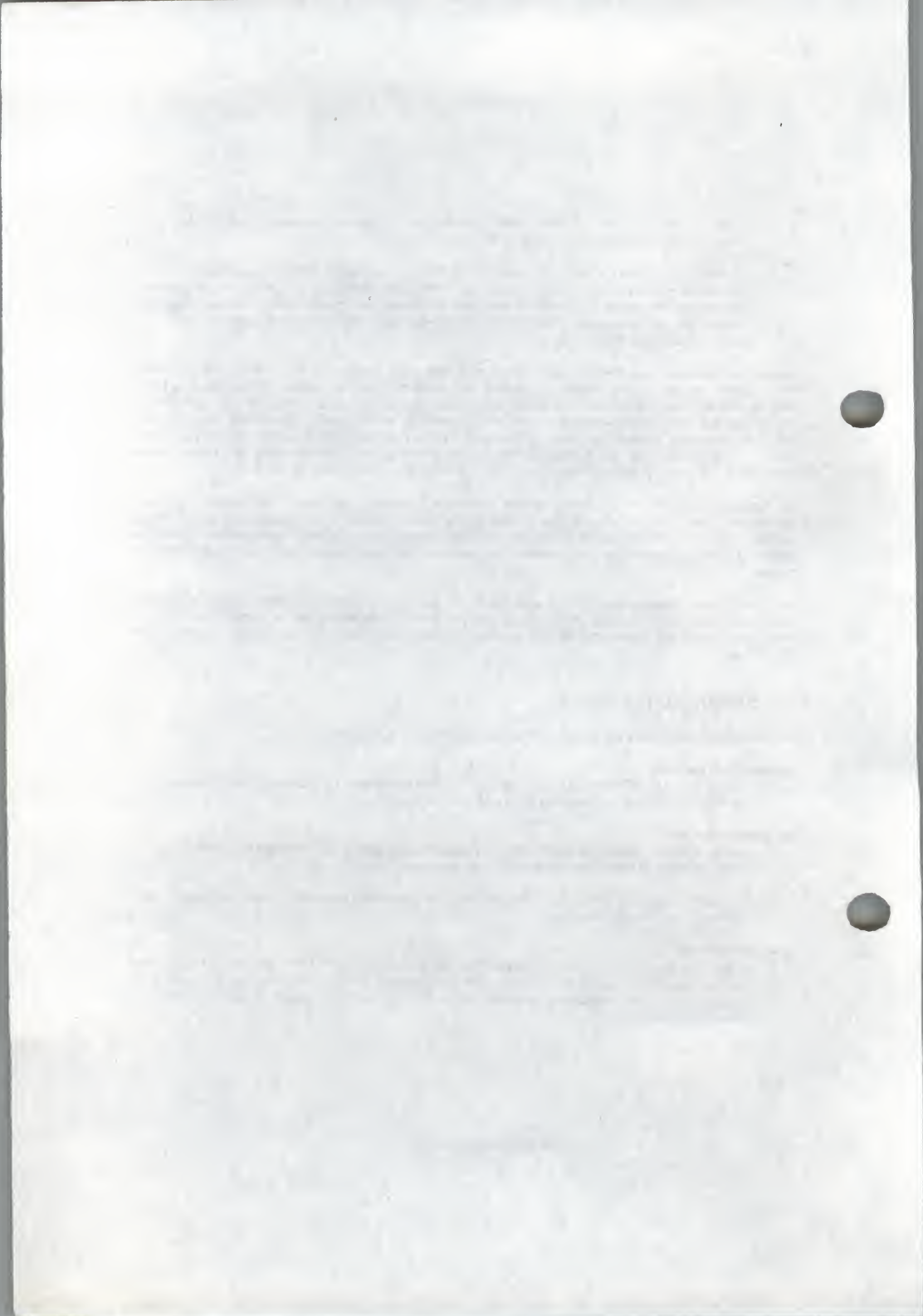
### Expanded memory

Paged memory outside the 1-MB memory space that is added to a PC through a specially designed EMS or EEMS card is referred to as expanded memory.

This term does not refer to "expansion" memory which is added to the PC system to complete the conventional memory allowance.

### Extended memory

In the PC-AT or AT-compatible, the memory in the range from 1 to 16 MB is referred to as extended memory. Most DOS-based applications cannot access this memory. Extended memory can be used under the XENIX(r) operating system, PC/IX, or by certain utility programs such as RAM drives and print spoolers.



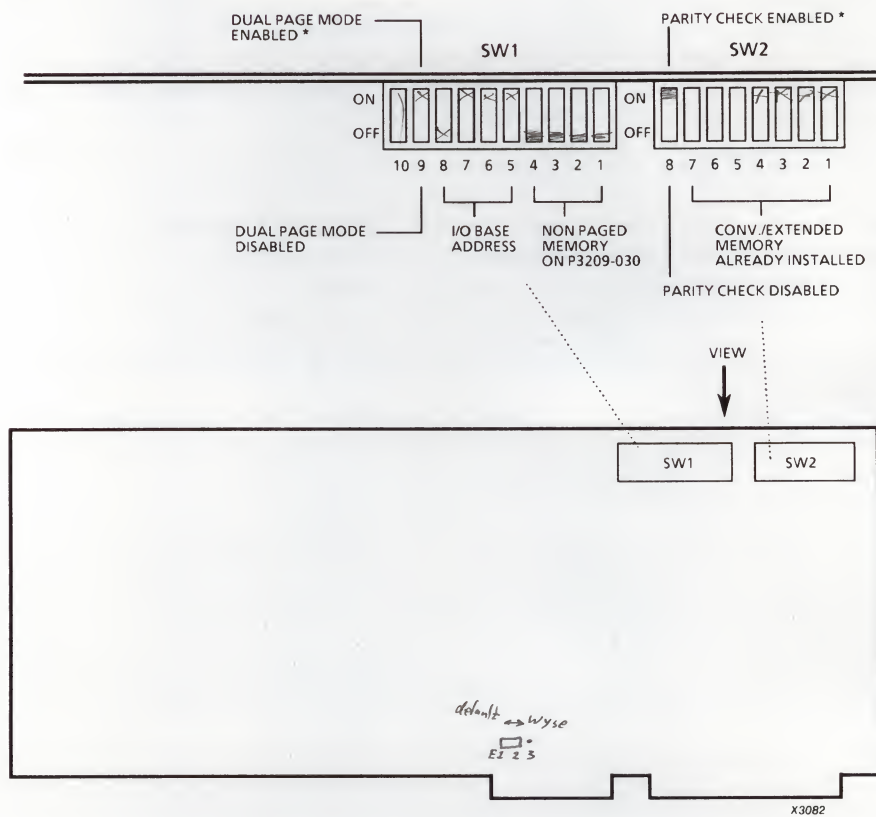
## 10.2. AST RAMPage 286

### 10.2.1. Characteristics AST RAMPage 286

The AST RAMPage 286 board is an option board to add memory capacity. The card can hold 256KB upto 2MB RAM, depending on the number of banks installed. In the following, memory from 0-640KB will be called **conventional** memory. Memory in the range 1MB to 16MB will be called **extended** memory. Conventional and extended memory are also called 'linear' or 'non-paged' memory. By switch selection it is possible to use (parts of) the memory on RAMPage 286 as conventional and / or extended memory. The remaining memory on the RAMPage card will then be used with a technique called memory paging. This means that the memory available on the RAMPage board is mapped into free 16KB pages (on 16KB boundaries) within the memory range 0-1MB. The memory used this way is called **expanded** memory. The AST RAMPage 286 is fully compatible with the Lotus/Intel/Microsoft (LIM) Expanded Memory Specification (EMS). In this specification, expanded memory is mapped in four contiguous 16KB windows above segment address C000 within the system ROM area. Furthermore this card supports the Enhanced Expanded Memory Specification (EEMS) technique. This allows mapping of the 16KB pages at any 16KB boundary in the range 0-1MB.



### 10.2.3. Strap Settings / Adjustments AST RAMPage 286



## Configuration DIP Switch 1

SWITCH 1	SETTING	FUNCTION
SW1-1 through SW1-4		CONVENTIONAL/EXTENDED MEMORY SIZE
SW1-5 through SW1-8		I/O BASE ADDRESS, SEE TABLE BELOW
SW1-9	* ON OFF	DUAL PAGE MODE ENABLED DUAL PAGE MODE DISABLED
SW1-10		NONE

### Conventional / Extended Memory Size: (SW1-1 till SW1-4)

Select with SW1-1 through SW1-4 the amount of RAMPAGE memory to be used as conventional or extended memory.

These settings are ignored if all RAMPAGE 286 memory is used as expanded (paged) memory (SW2-1 through SW2-7 : OFF).

RAMPAGE CONVENTIONAL OR EXTENDED MEMORY SIZE	SETTING				RAMPAGE CONVENTIONAL OR EXTENDED MEMORY SIZE	SETTING			
	SW 1-1	SW 1-2	SW 1-3	SW 1-4		SW 1-1	SW 1-2	SW 1-3	SW 1-4
128KB	ON	ON	ON	ON	1152KB	OFF	ON	ON	ON
256KB	ON	ON	ON	OFF	1280KB	OFF	ON	ON	OFF
384KB	ON	ON	OFF	ON	1408KB	OFF	ON	OFF	ON
512KB	ON	ON	OFF	OFF	1536KB	OFF	ON	OFF	OFF
640KB	ON	OFF	ON	ON	1664KB	OFF	OFF	ON	ON
768KB	ON	OFF	ON	OFF	1792KB	OFF	OFF	ON	OFF
896KB	ON	OFF	OFF	ON	1920KB	OFF	OFF	OFF	ON
1024KB	ON	OFF	OFF	OFF	2048KB	OFF	OFF	OFF	OFF

#### I/O Base Address: (SW1-5 till SW1-8)

If more than one RAMPage 286 card is installed, each must be strapped for different I/O addresses.

I/O ADDRESSES USED								SETTING			
BASE								SW1-5	SW1-6	SW1-7	SW1-8
0208	0209	4208	4209	8208	8209	C208	C209	ON	ON	ON	ON
0218	0219	4218	4219	8218	8219	C218	C219	ON *	ON *	ON *	OFF *
0258	0259	4258	4259	8258	8259	C258	C259	ON	OFF	ON	OFF
0268	0269	4268	4269	8268	8269	C268	C269	ON	OFF	OFF	ON
02A8	02A9	42A8	42A9	82A8	82A9	C2A8	C2A9	OFF	ON	OFF	ON
02B8	02B9	42B8	42B9	82B8	82B9	C2B8	C2B9	OFF	ON	OFF	OFF
02E8	02E9	42E8	42E9	82E8	82E9	C2E8	C2E9	OFF	OFF	OFF	ON

**NOTE:** \* Indicates default setting

#### Configuration DIP Switch 2

SWITCH 2	SETTING	FUNCTION
SW2-1 through SW2-7		CONVENTIONAL/EXTENDED (non-paged) MEMORY ALREADY INSTALLED, SEE NEXT TABLE
SW2-8	ON * OFF	PARITY CHECKING ENABLED PARITY CHECKING DISABLED

#### Conventional/Extended memory already installed in system: (SW2-1 till SW2-7)

If all all RAMPage memory is used as expanded (paged) memory, set the conventional/extended memory already installed to 16MB (SW2-1 through SW2-7 all OFF). If this is done, the settings for switches SW1-1 through SW1-4 are ignored.

**NOTE:** Do not count memory in the range from 640KB upto 1MB when determining the amount of Conventional/Extended (non-paged) memory.



CONV./ EXTENDED MEMORY ALREADY INSTALLED	SETTING							
	(K.Bytes)	SW2-1	SW2-2	SW2-3	SW2-4	SW2-5	SW2-6	SW2-7
0	ON	ON	ON	ON	ON	ON	ON	ON
128	ON	ON	ON	ON	ON	ON	ON	OFF
256	ON	ON	ON	ON	ON	ON	OFF	ON
384	ON	ON	ON	ON	ON	ON	OFF	OFF
512	ON	ON	ON	ON	ON	OFF	ON	ON
640	ON	ON	ON	ON	ON	OFF	ON	OFF
768	ON	ON	ON	ON	ON	OFF	OFF	ON
896	ON	ON	ON	ON	ON	OFF	OFF	OFF
1024	ON	ON	ON	OFF	ON	ON	ON	ON
1152	ON	ON	ON	OFF	ON	ON	ON	OFF
1280	ON	ON	ON	OFF	ON	ON	OFF	ON
1408	ON	ON	ON	OFF	ON	ON	OFF	OFF
1536	ON	ON	ON	OFF	OFF	ON	ON	ON
1664	ON	ON	ON	OFF	OFF	ON	ON	OFF
1792	ON	ON	ON	OFF	OFF	OFF	OFF	ON
1920	ON	ON	ON	OFF	OFF	OFF	OFF	OFF
2048	ON	ON	ON	OFF	ON	ON	ON	ON
2176	ON	ON	ON	OFF	ON	ON	ON	OFF
2304	ON	ON	ON	OFF	ON	ON	OFF	ON
2432	ON	ON	ON	OFF	ON	ON	OFF	OFF
2560	ON	ON	ON	OFF	ON	OFF	ON	ON
2688	ON	ON	ON	OFF	ON	OFF	ON	OFF
2816	ON	ON	ON	OFF	ON	OFF	OFF	ON
2944	ON	ON	ON	OFF	ON	OFF	OFF	OFF
3072	ON	ON	ON	OFF	OFF	ON	ON	ON
3200	ON	ON	ON	OFF	OFF	ON	ON	OFF
3328	ON	ON	ON	OFF	OFF	ON	ON	OFF
3456	ON	ON	ON	OFF	OFF	ON	OFF	OFF
3584	ON	ON	ON	OFF	OFF	OFF	ON	ON
3712	ON	ON	ON	OFF	OFF	OFF	ON	OFF
3840	ON	ON	ON	OFF	OFF	OFF	OFF	ON
3968	ON	ON	ON	OFF	OFF	OFF	OFF	OFF
4096	ON	ON	OFF	ON	ON	ON	ON	ON
4224	ON	ON	OFF	ON	ON	ON	ON	OFF
4352	ON	ON	OFF	ON	ON	ON	OFF	ON
4480	ON	ON	OFF	ON	ON	ON	OFF	OFF
4608	ON	ON	OFF	ON	ON	OFF	ON	ON
4736	ON	ON	OFF	ON	ON	OFF	ON	OFF
4864	ON	ON	OFF	ON	ON	OFF	OFF	ON
4992	ON	ON	OFF	ON	ON	OFF	OFF	OFF
5120	ON	ON	OFF	ON	OFF	ON	ON	ON
5248	ON	ON	OFF	ON	OFF	ON	ON	OFF
5376	ON	ON	OFF	ON	OFF	ON	OFF	ON
5504	ON	ON	OFF	ON	OFF	ON	OFF	OFF
5632	ON	ON	OFF	ON	OFF	OFF	ON	ON
5760	ON	ON	OFF	ON	OFF	OFF	ON	OFF
5888	ON	ON	OFF	ON	OFF	OFF	OFF	ON

**NOTE:** Do not count memory in the range 640KB upto 1MB when determining the amount of conventional / extended memory already installed.



CONV./ EXTENDED MEMORY ALREADY INSTALLED	SETTING						
(K.Bytes)	SW2-1	SW2-2	SW2-3	SW2-4	SW2-5	SW2-6	SW2-7
6016	ON	OFF	ON	OFF	OFF	OFF	OFF
6144	ON	OFF	OFF	ON	ON	ON	ON
6272	ON	OFF	OFF	ON	ON	ON	OFF
6400	ON	OFF	OFF	ON	ON	OFF	ON
6528	ON	OFF	OFF	ON	ON	OFF	OFF
6656	ON	OFF	OFF	ON	OFF	ON	ON
6784	ON	OFF	OFF	ON	OFF	ON	OFF
6912	ON	OFF	OFF	ON	OFF	OFF	ON
7040	ON	OFF	OFF	ON	OFF	OFF	OFF
7168	ON	OFF	OFF	OFF	ON	ON	ON
7296	ON	OFF	OFF	OFF	ON	ON	OFF
7424	ON	OFF	OFF	OFF	ON	OFF	ON
7552	ON	OFF	OFF	OFF	ON	OFF	OFF
7680	ON	OFF	OFF	OFF	OFF	ON	ON
7808	ON	OFF	OFF	OFF	OFF	ON	OFF
7936	ON	OFF	OFF	OFF	OFF	OFF	ON
8064	ON	OFF	OFF	OFF	OFF	OFF	OFF
8192	OFF	ON	ON	ON	ON	ON	ON
8320	OFF	ON	ON	ON	ON	ON	OFF
8448	OFF	ON	ON	ON	ON	OFF	ON
8576	OFF	ON	ON	ON	ON	OFF	OFF
8704	OFF	ON	ON	ON	OFF	ON	ON
8832	OFF	ON	ON	ON	OFF	ON	OFF
8960	OFF	ON	ON	ON	OFF	OFF	ON
9088	OFF	ON	ON	ON	OFF	OFF	OFF
9216	OFF	ON	ON	OFF	ON	ON	ON
9344	OFF	ON	ON	OFF	ON	ON	OFF
9472	OFF	ON	ON	OFF	ON	OFF	ON
9600	OFF	ON	ON	OFF	ON	OFF	OFF
9728	OFF	ON	ON	OFF	OFF	ON	ON
9856	OFF	ON	ON	OFF	OFF	ON	OFF
9984	OFF	ON	ON	OFF	OFF	OFF	ON
10112	OFF	ON	ON	OFF	OFF	OFF	OFF
10240	OFF	ON	OFF	ON	ON	ON	ON
10368	OFF	ON	OFF	ON	ON	ON	OFF
10496	OFF	ON	OFF	ON	ON	OFF	ON
10624	OFF	ON	OFF	ON	ON	OFF	OFF
10752	OFF	ON	OFF	ON	OFF	ON	ON
10880	OFF	ON	OFF	ON	OFF	ON	OFF
11008	OFF	ON	OFF	ON	OFF	OFF	ON
11136	OFF	ON	OFF	ON	OFF	OFF	OFF
11264	OFF	ON	OFF	OFF	ON	ON	ON
11392	OFF	ON	OFF	OFF	ON	ON	OFF
11520	OFF	ON	OFF	OFF	ON	OFF	ON
11648	OFF	ON	OFF	OFF	ON	OFF	OFF
11776	OFF	ON	OFF	OFF	OFF	ON	ON
11904	OFF	ON	OFF	OFF	OFF	ON	OFF

**NOTE:** Do not count memory in the range 640KB upto 1MB when determining the amount of conventional / extended memory already installed.

CONV./ EXTENDED MEMORY ALREADY INSTALLED	SETTING						
(K.Bytes)	SW2-1	SW2-2	SW2-3	SW2-4	SW2-5	SW2-6	SW2-7
12032	OFF	ON	OFF	OFF	OFF	OFF	ON
12160	OFF	ON	OFF	OFF	OFF	OFF	OFF
12288	OFF	OFF	ON	ON	ON	ON	ON
12416	OFF	OFF	ON	ON	ON	ON	OFF
12544	OFF	OFF	ON	ON	ON	OFF	ON
12672	OFF	OFF	ON	ON	ON	OFF	OFF
12800	OFF	OFF	ON	ON	OFF	ON	ON
12928	OFF	OFF	ON	ON	OFF	ON	OFF
13056	OFF	OFF	ON	ON	OFF	OFF	ON
13184	OFF	OFF	ON	ON	OFF	OFF	OFF
13312	OFF	OFF	ON	OFF	ON	ON	ON
13440	OFF	OFF	ON	OFF	ON	ON	OFF
13568	OFF	OFF	ON	OFF	ON	OFF	ON
13696	OFF	OFF	ON	OFF	ON	OFF	OFF
13824	OFF	OFF	ON	OFF	OFF	ON	ON
13952	OFF	OFF	ON	OFF	OFF	ON	OFF
14080	OFF	OFF	ON	OFF	OFF	OFF	ON
14208	OFF	OFF	ON	OFF	OFF	OFF	OFF
14336	OFF	OFF	OFF	ON	ON	ON	ON
14464	OFF	OFF	OFF	ON	ON	ON	OFF
14592	OFF	OFF	OFF	ON	ON	OFF	ON
14720	OFF	OFF	OFF	ON	ON	OFF	OFF
14848	OFF	OFF	OFF	ON	OFF	ON	ON
14976	OFF	OFF	OFF	ON	OFF	ON	OFF
15104	OFF	OFF	OFF	ON	OFF	OFF	ON
15232	OFF	OFF	OFF	ON	OFF	OFF	OFF
15360	OFF	OFF	OFF	OFF	ON	ON	ON
15488	OFF	OFF	OFF	OFF	ON	ON	OFF
15616	OFF	OFF	OFF	OFF	ON	OFF	ON
15744	OFF	OFF	OFF	OFF	ON	OFF	OFF
15872	OFF	OFF	OFF	OFF	OFF	ON	ON
All RAMPage memory used as expanded (paged) memory	OFF	OFF	OFF	OFF	OFF	ON	OFF
	OFF	OFF	OFF	OFF	OFF	OFF	ON
	OFF	OFF	OFF	OFF	OFF	OFF	OFF

**NOTE:** Do not count memory in the range 640KB upto 1MB when determining the amount of conventional / extended memory already installed.

### 10.2.5. Installation / Maintenance AST RAMPAGE 286

This board plugs into an AT I/O slot. Ensure that there is no conflict with other memory in the system (SIMM or other options) when part of the available RAMPAGE memory is used as conventional/extended memory (selected by SW1). SW1 setting is ignored if all available memory is used as expanded (paged) memory (SW2-1 through SW2-7 OFF).

Memory is upgradeable in 512KB increments, using 256KB chips. Up to four RAMPAGE boards can be installed.

Run the SETUP command whenever the amount of conventional or extended memory has been changed.

#### **P3200-I:**

When AST RAMPAGE 286 is installed then strap E6 on the main-board should be open (Enable I/O slot refresh).

#### **P3200-II, P3202:**

When AST RAMPAGE 286 is installed on a main-board using an 8MHz. Processor clock, strap W12 on the main board should be open. (Insert 1 wait state for RAM).

#### **P3204:**

When AST RAMPAGE 286 is installed, then for proper working the speed of the system must be set to 8MHz and 1 wait. Change this with the Setup command.



### 10.3. AST RAM VANTAGE

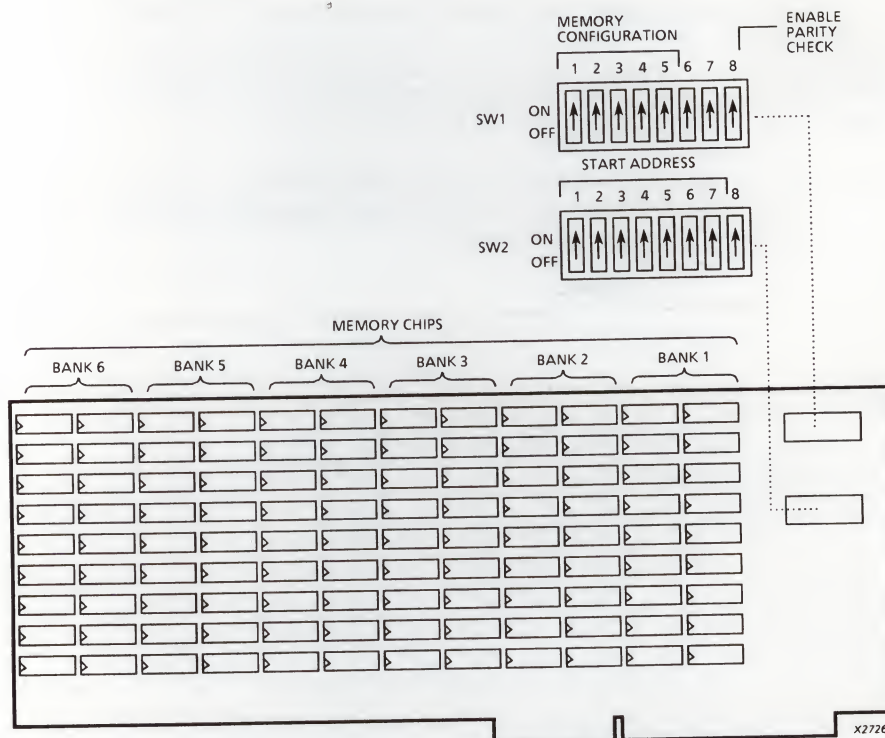
#### 10.3.1. Characteristics AST RAM Vantage

The RAM Vantage board is an option board to expand memory. The memory capacity is 128KB upto 3MB, depending on the type of the memory chips used and the number of banks installed. Memory can be installed, using 64K1 or 256K1 chips. This should always result in a configuration according to the Memory Configuration Table in this chapter.

**NOTE:** *MS-DOS supports a maximum of 640KB RAM (00000-9FFFFH) for programs. If more RAM is installed (e.g. with AST RAM Vantage) this can only be used as a RAMDISK or something similar.*



### 10.3.3. Strap Settings / Adjustments RAM Vantage



# Configuration DIP Switch 1

SWITCH	SETTING	FUNCTION
SW1-SW5		MEMORY CONFIGURATION, SEE TABLE BELOW
SW6		NONE
SW7		NONE
SW8	* ON OFF	PARITY CHECK ENABLED PARITY CHECK DISABLED

Memory Configuration Table

INSTALLED						SETTING				
bank 1	bank 2	bank 3	bank 4	bank 5	bank 6	SW1-1	SW1-2	SW1-3	SW1-4	SW1-5
128KB						OFF	OFF	OFF	OFF	ON
* 512KB						OFF	OFF	ON	ON	ON
128KB	128KB					OFF	OFF	OFF	ON	OFF
128KB	512KB					ON	OFF	OFF	OFF	OFF
* 512KB	512KB					OFF	ON	OFF	OFF	OFF
128KB	128KB	128KB				OFF	OFF	OFF	ON	ON
128KB	128KB	512KB				ON	OFF	ON	OFF	ON
128KB	512KB	512KB				ON	OFF	OFF	OFF	ON
* 512KB	512KB	512KB				OFF	ON	OFF	OFF	ON
128KB	128KB	128KB	128KB			OFF	OFF	ON	OFF	OFF
128KB	128KB	128KB	512KB			ON	ON	OFF	OFF	ON
128KB	128KB	512KB	512KB			ON	OFF	ON	ON	OFF
128KB	512KB	512KB	512KB			ON	OFF	OFF	ON	OFF
* 512KB	512KB	512KB	512KB			OFF	ON	OFF	ON	OFF
128KB	128KB	128KB	128KB	128KB		OFF	OFF	ON	OFF	ON
128KB	128KB	128KB	128KB	512KB		ON	ON	ON	OFF	OFF
128KB	128KB	128KB	512KB	512KB		ON	ON	OFF	ON	ON
128KB	128KB	512KB	512KB	512KB		ON	OFF	ON	ON	ON
128KB	512KB	512KB	512KB	512KB		ON	OFF	OFF	ON	ON
* 512KB	512KB	512KB	512KB	512KB		OFF	ON	OFF	ON	ON
128KB	128KB	128KB	128KB	128KB	128KB	OFF	OFF	ON	ON	OFF
128KB	128KB	128KB	128KB	128KB	512KB	ON	ON	ON	ON	OFF
128KB	128KB	128KB	128KB	512KB	512KB	ON	ON	ON	OFF	ON
128KB	128KB	128KB	512KB	512KB	512KB	ON	ON	OFF	ON	ON
128KB	128KB	512KB	512KB	512KB	512KB	ON	ON	OFF	OFF	OFF
128KB	512KB	512KB	512KB	512KB	512KB	ON	ON	OFF	OFF	OFF
* 512KB	512KB	512KB	512KB	512KB	512KB	OFF	ON	ON	OFF	OFF

**NOTE:** For use in P3400 only 512KB memory banks are supported. These configurations are marked with \* in the table.

# Configuration DIP Switch 2

SWITCH	SETTING	FUNCTION
SW1-SW7		RAM Vantage START ADDRESS . SEE TABLE BELOW
SW8		NONE

## Start Address DIP Switch 2

Bank 1

B2

B3

B4

B5

B6

START ADDRESS		SETTING						
(M.Bytes)	(K.Bytes)	SW2-1	SW2-2	SW2-3	SW2-4	SW2-5	SW2-6	SW2-7
0.250	256	ON	ON	ON	ON	ON	OFF	ON
0.500	512	ON	ON	ON	ON	OFF	ON	ON
1.000	1024	ON	ON	ON	OFF	ON	ON	ON
1.125	1152	ON	ON	ON	OFF	ON	ON	OFF
1.250	1280	ON	ON	ON	OFF	ON	OFF	ON
1.375	1408	ON	ON	ON	OFF	ON	OFF	OFF
1.500	1536	ON	ON	ON	OFF	OFF	ON	ON
1.625	1664	ON	ON	ON	OFF	OFF	ON	OFF
1.750	1792	ON	ON	ON	OFF	OFF	OFF	ON
1.875	1920	ON	ON	ON	OFF	OFF	OFF	OFF
2.000	2048	ON	ON	OFF	ON	ON	ON	ON
2.125	2176	ON	ON	OFF	ON	ON	ON	OFF
2.250	2304	ON	ON	OFF	ON	ON	OFF	ON
2.375	2432	ON	ON	OFF	ON	ON	OFF	OFF
2.500	2560	ON	ON	OFF	ON	OFF	ON	ON
2.625	2688	ON	ON	OFF	ON	OFF	ON	OFF
2.750	2816	ON	ON	OFF	ON	OFF	OFF	ON
2.875	2944	ON	ON	OFF	ON	OFF	OFF	OFF
3.000	3072	ON	ON	OFF	OFF	ON	ON	ON
3.125	3200	ON	ON	OFF	OFF	ON	ON	OFF
3.250	3328	ON	ON	OFF	OFF	ON	OFF	ON
3.375	3456	ON	ON	OFF	OFF	ON	OFF	OFF
3.500	3584	ON	ON	OFF	OFF	OFF	ON	ON
3.625	3712	ON	ON	OFF	OFF	OFF	ON	OFF
3.750	3840	ON	ON	OFF	OFF	OFF	OFF	ON
3.875	3968	ON	ON	OFF	OFF	OFF	OFF	OFF
4.000	4096	ON	OFF	ON	ON	ON	ON	ON
4.125	4224	ON	OFF	ON	ON	ON	ON	OFF
4.250	4352	ON	OFF	ON	ON	ON	OFF	ON
4.375	4480	ON	OFF	ON	ON	ON	OFF	OFF
4.500	4608	ON	OFF	ON	ON	OFF	ON	ON
4.625	4736	ON	OFF	ON	ON	OFF	ON	OFF
4.750	4864	ON	OFF	ON	ON	OFF	OFF	ON
4.875	4992	ON	OFF	ON	ON	OFF	OFF	OFF



Start Address DIP Switch 2 (continued)

START ADDRESS		SETTING						
(M.Bytes)	(K.Bytes)	SW2-1	SW2-2	SW2-3	SW2-4	SW2-5	SW2-6	SW2-7
5.000	5120	ON	OFF	ON	OFF	ON	ON	ON
5.125	5248	ON	OFF	ON	OFF	ON	ON	OFF
5.250	5376	ON	OFF	ON	OFF	ON	OFF	ON
5.375	5504	ON	OFF	ON	OFF	ON	OFF	OFF
5.500	5632	ON	OFF	ON	OFF	OFF	ON	ON
5.625	5760	ON	OFF	ON	OFF	OFF	ON	OFF
5.750	5888	ON	OFF	ON	OFF	OFF	OFF	ON
5.875	6016	ON	OFF	ON	OFF	OFF	OFF	OFF
6.000	6144	ON	OFF	OFF	ON	ON	ON	ON
6.125	6272	ON	OFF	OFF	ON	ON	ON	OFF
6.250	6400	ON	OFF	OFF	ON	ON	OFF	ON
6.375	6528	ON	OFF	OFF	ON	ON	OFF	OFF
6.500	6656	ON	OFF	OFF	ON	OFF	ON	ON
6.625	6784	ON	OFF	OFF	ON	OFF	ON	OFF
6.750	6912	ON	OFF	OFF	ON	OFF	OFF	ON
6.875	7040	ON	OFF	OFF	ON	OFF	OFF	OFF
7.000	7168	ON	OFF	OFF	OFF	ON	ON	ON
7.125	7296	ON	OFF	OFF	OFF	ON	ON	OFF
7.250	7424	ON	OFF	OFF	OFF	ON	ON	OFF
7.375	7552	ON	OFF	OFF	OFF	ON	OFF	OFF
7.500	7680	ON	OFF	OFF	OFF	OFF	ON	ON
7.625	7808	ON	OFF	OFF	OFF	OFF	ON	OFF
7.750	7936	ON	OFF	OFF	OFF	OFF	OFF	ON
7.875	8064	ON	OFF	OFF	OFF	OFF	OFF	OFF
8.000	8192	OFF	ON	ON	ON	ON	ON	ON
8.125	8320	OFF	ON	ON	ON	ON	ON	OFF
8.250	8448	OFF	ON	ON	ON	ON	OFF	ON
8.375	8576	OFF	ON	ON	ON	ON	OFF	OFF
8.500	8704	OFF	ON	ON	ON	OFF	ON	ON
8.625	8832	OFF	ON	ON	ON	OFF	ON	OFF
8.750	8960	OFF	ON	ON	ON	OFF	OFF	ON
8.875	9088	OFF	ON	ON	ON	OFF	OFF	OFF
9.000	9216	OFF	ON	ON	OFF	ON	ON	ON
9.125	9344	OFF	ON	ON	OFF	ON	ON	OFF
9.250	9472	OFF	ON	ON	OFF	ON	OFF	ON
9.375	9600	OFF	ON	ON	OFF	ON	OFF	OFF
9.500	9728	OFF	ON	ON	OFF	OFF	ON	ON
9.625	9856	OFF	ON	ON	OFF	OFF	ON	OFF
9.750	9984	OFF	ON	ON	OFF	OFF	OFF	ON
9.875	10112	OFF	ON	ON	OFF	OFF	OFF	OFF
10.000	10240	OFF	ON	OFF	ON	ON	ON	ON
10.125	10368	OFF	ON	OFF	ON	ON	ON	OFF
10.250	10496	OFF	ON	OFF	ON	ON	OFF	ON
10.375	10624	OFF	ON	OFF	ON	ON	OFF	OFF
10.500	10752	OFF	ON	OFF	ON	OFF	ON	ON
10.625	10880	OFF	ON	OFF	ON	OFF	ON	OFF
10.750	11008	OFF	ON	OFF	ON	OFF	OFF	ON
10.875	11136	OFF	ON	OFF	ON	OFF	OFF	OFF



Start Address DIP Switch 2 (continued)

START ADDRESS		SETTING						
(M.Bytes)	(K.Bytes)	SW2-1	SW2-2	SW2-3	SW2-4	SW2-5	SW2-6	SW2-7
11.000	11264	OFF	ON	OFF	OFF	ON	ON	ON
11.125	11392	OFF	ON	OFF	OFF	ON	ON	OFF
11.250	11520	OFF	ON	OFF	OFF	ON	OFF	ON
11.375	11648	OFF	ON	OFF	OFF	ON	OFF	OFF
11.500	11776	OFF	ON	OFF	OFF	OFF	ON	ON
11.625	11904	OFF	ON	OFF	OFF	OFF	ON	OFF
11.750	12032	OFF	ON	OFF	OFF	OFF	OFF	ON
11.875	12160	OFF	ON	OFF	OFF	OFF	OFF	OFF
12.000	12288	OFF	OFF	ON	ON	ON	ON	ON
12.125	12416	OFF	OFF	ON	ON	ON	ON	OFF
12.250	12544	OFF	OFF	ON	ON	ON	OFF	ON
12.375	12672	OFF	OFF	ON	ON	ON	OFF	OFF
12.500	12800	OFF	OFF	ON	ON	OFF	ON	ON
12.625	12928	OFF	OFF	ON	ON	OFF	ON	OFF
12.750	13056	OFF	OFF	ON	ON	OFF	OFF	ON
12.875	13184	OFF	OFF	ON	ON	OFF	OFF	OFF
13.000	13312	OFF	OFF	ON	OFF	ON	ON	ON
13.125	13440	OFF	OFF	ON	OFF	ON	ON	OFF
13.250	13568	OFF	OFF	ON	OFF	ON	OFF	ON
13.375	13696	OFF	OFF	ON	OFF	ON	OFF	OFF
13.500	13824	OFF	OFF	ON	OFF	OFF	ON	ON
13.625	13952	OFF	OFF	ON	OFF	OFF	ON	OFF
13.750	14080	OFF	OFF	ON	OFF	OFF	OFF	ON
13.875	14208	OFF	OFF	ON	OFF	OFF	OFF	OFF
14.000	14336	OFF	OFF	OFF	ON	ON	ON	ON
14.125	14464	OFF	OFF	OFF	ON	ON	ON	OFF
14.250	14592	OFF	OFF	OFF	ON	ON	OFF	ON
14.375	14720	OFF	OFF	OFF	ON	ON	OFF	OFF
14.500	14848	OFF	OFF	OFF	ON	OFF	ON	ON
14.625	14976	OFF	OFF	OFF	ON	OFF	ON	OFF
14.750	15104	OFF	OFF	OFF	ON	OFF	OFF	ON
14.875	15232	OFF	OFF	OFF	ON	OFF	OFF	OFF
15.000	15360	OFF	OFF	OFF	OFF	ON	ON	ON
15.125	15488	OFF	OFF	OFF	OFF	ON	ON	OFF
15.250	15616	OFF	OFF	OFF	OFF	ON	OFF	ON
15.375	15744	OFF	OFF	OFF	OFF	ON	OFF	OFF
15.500	15872	OFF	OFF	OFF	OFF	OFF	ON	ON
15.625	16000	OFF	OFF	OFF	OFF	OFF	ON	OFF
15.750	16128	OFF	OFF	OFF	OFF	OFF	OFF	ON
15.875	16256	OFF	OFF	OFF	OFF	OFF	OFF	OFF

### 10.3.5. Installation / Maintenance RAM Vantage

This board plugs into an AT I/O slot. Ensure that there is no conflict with other memory in the system (SIMM or other options) by strapping the RAM Vantage start address. More memory can be installed, using 64K1 or 256K1 chips. Once a bank of 256K1 chips is installed, all the following banks must use only 256K1 chips. This should always result in a configuration according to the Memory Configuration Table in this chapter.

#### P3200-I:

When RAM Vantage is installed, strap **E6 must be removed** (Enable I/O slot refresh).

#### P3200-II, P3202:

When the RAM Vantage is installed on a main-board using an 8MHz. Processor clock, strap **W12 must be removed**. (Insert 1 wait state for RAM).

#### P3400:

When the RAM Vantage is installed on a main-board using an 8MHz. Processor clock, strap **W12 must be removed**. (Insert 1 wait state for RAM).

The following start addresses appear in standard P3400 configurations:

SIMM Installed	System Memory	Start Address	Setting SW2						
			1	2	3	4	5	6	7
128 KB	640 KB	1.000 MB	ON	ON	ON	OFF	ON	ON	ON
512 KB	1.0 MB	1.375 MB	ON	ON	ON	OFF	ON	OFF	OFF
2 MB	2.5 MB	2.875 MB	ON	ON	OFF	ON	OFF	OFF	OFF



## 10.4. HIGH-SPEED MEMORY EXPANSION BOARD

### 10.4.1. Characteristics High-speed memory expansion board

The High-speed Memory expansion Board (HMB) is an option board to add memory capacity. The HMB can provide up to 8MB DRAM. 4MB memory is built into the expansion board, and another 4MB memory is put on a piggy back board (HPB) on the HMB. The size of the memory can be increased with 2MB (one bank) increments. The number of banks is set with dip-switches. The HMB board provides a 32-bit wide data path, and interleaved memory with zero wait states under 16MHz system clock.

*only for P3301*



The diagram illustrates the HPB BOARD, which is connected to the HMB. The HPB BOARD contains four memory banks, each 2MB in size:

- BANK 1 1st 2MB**
- BANK 2 2nd 2MB**
- BANK 3 3rd 2MB**
- BANK 4 4th 2MB**

Each bank is represented by a vertical column of eight memory modules. The address range for each bank is indicated as B1 A1 to B25 A25. The HPB BOARD is connected to the HMB via a bus labeled A31, A1, C18, and C1.

Control elements on the HPB BOARD include:

- SW1**: A 4-position switch labeled 1, 2, 3, 4. It is currently set to "ON". Below the switch, a bracket indicates "MEMORY MODES" and "WAIT STATE".
- JP1 PARITY CHECK**: A jump point with two settings:
  - DISABLE**: Indicated by a dot at position 1 and a solid circle at position 2.
  - ENABLE**: Indicated by a solid circle at position 1 and a dot at position 2.

X2145

**NOTE:** The memory mode of the system board should be set to Mode 3 or Mode 4.  
Only a maximum of 7936KB on the HMB board is accessible.

DIP Switch 1 (HMB Mode)

SWITCH	MODE 1 140000H-33FFFFH	MODE 2 140000H-53FFFFH	MODE 3 140000H-73FFFFH	MODE 4 140000H-83FFFFH
SW1-1	ON	OFF	OFF	OFF
SW1-2	ON	ON	OFF	OFF
SW1-3	ON	ON	ON	OFF
Installed Banks	Bank1	Bank 1-2	Bank 1-2-3	Bank 1-2-3-4
Installed Memory	2048KB	4096KB	6144KB	7936KB

WAIT States (During Memory Access):

SWITCH	1 WAIT STATE 4-8MB INSTALLED	0 WAIT STATES 2-4MB INSTALLED
SW1-4	OFF	ON

#### **10.4.5. Installation / Maintenance High-speed memory expansion board.**

**P3301:**

This board plugs only into the special memory extension slot, it should not be plugged into other slots. Ensure that the memory mode of the system board is set to Mode 3 or Mode 4. Memory is upgradeable in 2MB increments, using 256K4 chips. Run the SETUP command whenever the amount of conventional or extended memory has been changed.

## 10.5. MICRON 2 / 4MB 16-BIT MEMORY CARD

### 10.5.1. Characteristics Micron Memory Card

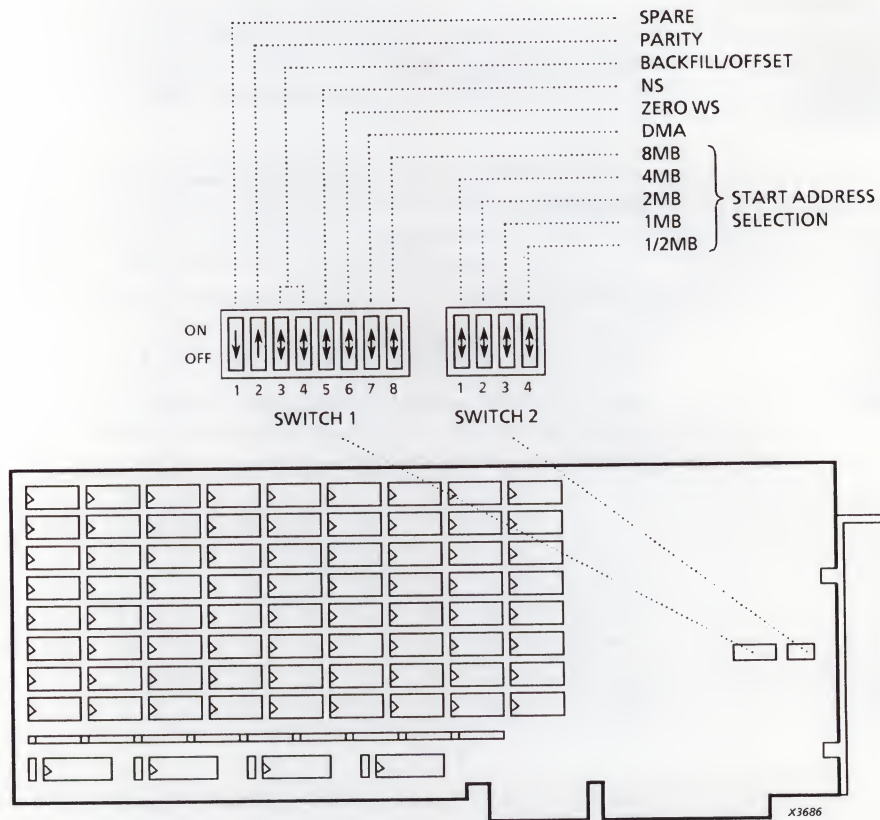
The Micron memory card is an option board to add more RAM memory. The card can hold up to 4MB RAM (2MB on the board itself, another 2MB on a piggy-back PCB which results in having 4MB in one slot). The Micron memory card is fully compatible with the Lotus/Intel/Microsoft Expanded Memory Specification (LIM/EMS). The card can be offset to 1/2MB boundaries.

In the following, memory from 0-640KB will be called **conventional** memory. Memory above 1MB will be called **extended** memory. A portion of the memory board can be used to increase memory to 640 KB for computers that have less than 640KB installed on the motherboard. This is called **backfilling** memory. If more than 1 board is installed and backfilling is required, only the board using the highest memory address should be set for backfill.

**NOTE:** *For MS-DOS users: MS-DOS supports a maximum of 640 KB RAM (the conventional memory) for programs. Extended memory (if installed) can only be used as a RAMDISK or something similar.*



### 10.5.3. Strap Settings / Adjustments Micron Memory Card



# Configuration DIP Switch 1

SWITCH 1	SETTING	FUNCTION
SW1-1	ON * OFF	SPARE
SW1-2	* ON OFF	PARITY ENABLED PARITY DISABLED
SW1-3 SW1-4		REFER TO TABLE 2
SW1-5	ON OFF	SETTING FOR SYSTEMS NOT OPERATING AT 8 MHZ, 0 WAIT STATE (E.G. 8MHZ, 1WAIT STATE ETC.) SETTING FOR SYSTEMS OPERATING AT 8 MHZ, 0 WAIT STATE
SW1-6	ON OFF	SETTING FOR SYSTEMS OPERATING AT 8 MHZ, 0 WAIT STATE OR SLOWER SETTING FOR SYSTEMS OPERATING FASTER THEN 8 MHZ, OR DO NOT SUPPORT 0 WAIT STATE
SW1-7	ON OFF	PROPER SETTING FOR MOST APPLICATIONS CORRECT SETTING WHEN USING PERIPHERALS PERFORMING DMA TO EXTENDED MEMORY
SW1-8	ON OFF	ADDS 8MB TO THE STARTING ADDRESS LOCATION USED BY THIS BOARD (REFER TO TABLE 4) NO ADDITIONAL OFFSET ABOVE THAT INDICATED ON THE OTHER OFFSET SWITCHES

\* Default

Table 1

SW 1-3	SW1-4	FUNCTION
OFF	OFF	NO BACKFILL, NO 384K OFFSET
OFF	ON	384K OFFSET IN EXTENDED MEMORY (USED IN SYSTEMS THAT HAVE 1MB ON THE MAIN BOARD THAT SUPPLIES 384KB OF EXTENDED MEMORY, LOCATED DIRECTLY ABOVE 1MB. WHEN THIS IS THE CASE, THIS SELECTION MUST BE MADE ON ALL MICRON MEMORY CARDS IN THE SYSTEM)
ON	OFF	BACKFILL 128K TO CONVENTIONAL MEMORY (USED IN 512K SYSTEMS TO ADD UP TO 640K) SEE NOTE
ON	ON	BACKFILL 384K TO CONVENTIONAL MEMORY (USED IN 256K SYSTEMS TO ADD UP TO 640K) SEE NOTE

**NOTE:** If more than 1 board is installed and backfilling is required, only the board using the highest memory address should be set for backfill.

Table 2

## Configuration DIP Switch 2

SWITCH 2	SETTING	FUNCTION
SW2-1	ON OFF	ADDS 4MB TO THE STARTING ADDRESS LOCATION USED BY THIS BOARD (REFER TO TABLE 4) NO ADDITIONAL OFFSET ABOVE THAT INDICATED ON THE OTHER OFFSET SWITCHES
SW2-2	ON OFF	ADDS 2MB TO THE STARTING ADDRESS LOCATION USED BY THIS BOARD (REFER TO TABLE 4) NO ADDITIONAL OFFSET ABOVE THAT INDICATED ON THE OTHER OFFSET SWITCHES
SW2-3	ON OFF	ADDS 1MB TO THE STARTING ADDRESS LOCATION USED BY THIS BOARD (REFER TO TABLE 4) NO ADDITIONAL OFFSET ABOVE THAT INDICATED ON THE OTHER OFFSET SWITCHES
SW2-4	ON OFF	ADDS 1/2MB TO THE STARTING ADDRESS LOCATION USED BY THIS BOARD (REFER TO TABLE 4) NO ADDITIONAL OFFSET ABOVE THAT INDICATED ON THE OTHER OFFSET SWITCHES

Table 3

Starting addresses are selected with SW1-8 and SW2-1 thr. 2-4. The selected memory ranges are indicated in the next table:

SWITCH SETTING					STARTING ADDRESS	ENDING ADDRESS (2MB )	ENDING ADDRESS (4MB )
SW1-8	SW2-1	SW2-2	SW2-3	SW2-4			
OFF	OFF	OFF	OFF	OFF	INVALID*		
OFF	OFF	OFF	OFF	ON	INVALID*		
OFF	OFF	OFF	ON	OFF	1024K	3072K	5120K
OFF	OFF	OFF	ON	ON	1536K	3584K	5632K
OFF	OFF	ON	OFF	OFF	2048K	4096K	6144K
OFF	OFF	ON	OFF	ON	2560K	4608K	6656K
OFF	OFF	ON	ON	OFF	3072K	5120K	7168K
OFF	OFF	ON	ON	ON	3584K	5632K	7680K
OFF	ON	OFF	OFF	OFF	4096K	6144K	8192K
OFF	ON	OFF	OFF	ON	4608K	6656K	8704K
OFF	ON	OFF	ON	OFF	5120K	7168K	9216K
OFF	ON	OFF	ON	ON	5632K	7680K	9728K
OFF	ON	ON	OFF	OFF	6144K	8192K	10240K
OFF	ON	ON	OFF	ON	6656K	8704K	10752K
OFF	ON	ON	ON	OFF	7168K	9216K	11264K
OFF	ON	ON	ON	ON	7680K	9728K	11776K
ON	OFF	OFF	OFF	OFF	8192K	10240K	12288K
ON	OFF	OFF	OFF	ON	8704K	10752K	12800K
ON	OFF	OFF	ON	OFF	9216K	11264K	13312K
ON	OFF	OFF	ON	ON	9728K	11776K	13824K
ON	OFF	ON	OFF	OFF	10240K	12288K	14336K
ON	OFF	ON	OFF	ON	10752K	12800K	14848K
ON	OFF	ON	ON	OFF	11264K	13312K	15360K
ON	OFF	ON	ON	ON	11776K	13824K	15872K
ON	ON	OFF	OFF	OFF	12288K	14356K	16384K
ON	ON	OFF	OFF	ON	12800K	14848K	16384K
ON	ON	OFF	ON	OFF	13312K	15360K	16384K
ON	ON	OFF	ON	ON	13824K	15872K	16384K
ON	ON	ON	OFF	OFF	14336K	16384K	16384K
ON	ON	ON	OFF	ON	INVALID*		
ON	ON	ON	ON	OFF	INVALID*		
ON	ON	ON	ON	ON	INVALID*		

\* Board is turned off

**NOTE:** The values in this table are only valid if no option board memory is used for backfill and no 384K offset is used. In that case the values have to be calculated using table 1 thr. 3

Table 4



#### 10.5.4. Modification History Micron Memory Card

SI-NR	SUBJECT
P3000-089	Introduction of Micron technology 2MB memory extension.

#### 10.5.5. Installation / Maintenance Micron Memory Card

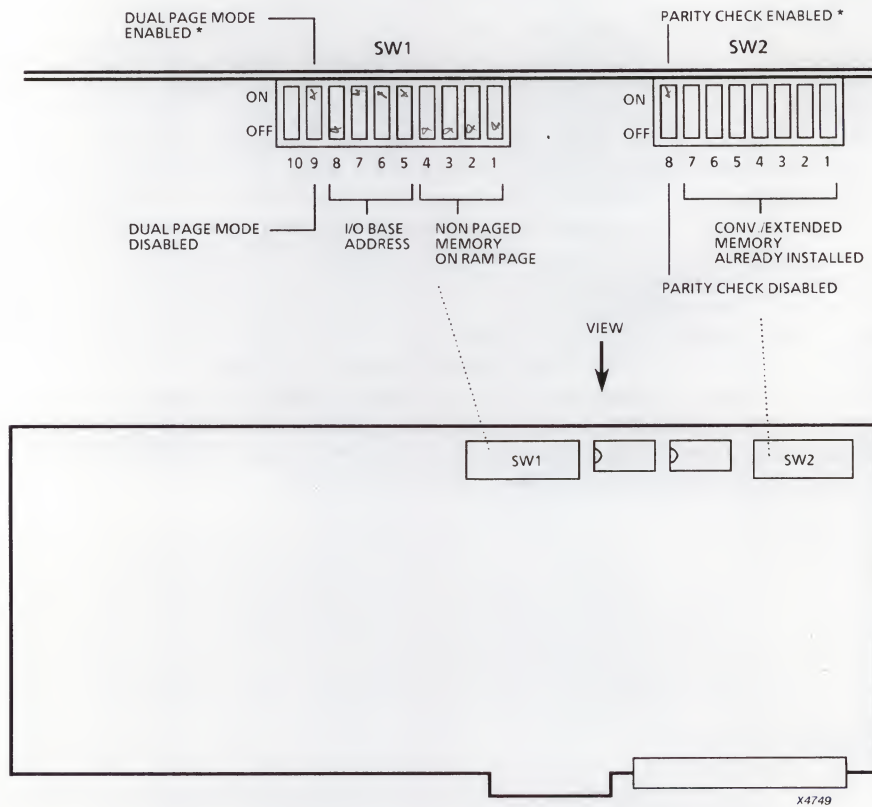
1. Take care that the switch settings on the board are correct
2. Turn off the system
3. Remove the cover
4. Remove the expansion slot cover
5. Insert the board into an AT-compatible option slot
6. Secure the board by screwing the mounting bracket to the computer frame
7. Replace the cover and turn the system on
8. Correct the memory size contained in CMOS-RAM according to the new situation

## 10.6. AST RAMPage AT

### 10.6.1. Characteristics AST RAMPage AT

The AST RAMPage AT board is an option board to add memory capacity. The card contains 2MB of RAM (although the board is designed to operate with 512 KB, 1MB or 1.5 MB RAM depending on the number of banks installed - these options are not supported). In this description, memory from 0-640KB will be called **conventional** memory. Memory in the range 1MB to 16MB will be called **extended** memory. Conventional and extended memory are also called 'linear' or 'non-paged' memory. By switch selection, it is possible to use (parts of) the memory on RAMPage AT as conventional and / or extended memory. The remaining memory on the RAMPage card will then be used with a technique called memory paging. This means that the memory available on the RAMPage board is mapped into free 16KB pages (on 16KB boundaries) within the memory range 0-1MB. The memory used this way is called **expanded** memory. The AST RAMPage AT is fully compatible with the Lotus/Intel/Microsoft (LIM) Expanded Memory Specification (EMS). In this specification, expanded memory is mapped in four contiguous 16KB windows above segment address C000H within the system ROM area. Furthermore this card supports the Enhanced Expanded Memory Specification (EEMS) technique. This allows mapping of the 16KB pages at any 16KB boundary in the range 0-1MB.

### 10.6.3. Strap Settings / Adjustments AST RAMPage AT



## Configuration DIP Switch 1

SWITCH 1	SETTING	FUNCTION
SW1-1 through SW1-4		CONVENTIONAL EXTENDED MEMORY SIZE
SW1-5 through SW1-8		I/O BASE ADDRESS, SEE TABLE BELOW
SW1-9	* ON OFF	DUAL PAGE MODE ENABLED DUAL PAGE MODE DISABLED
SW1-10		NONE

**Note:** \* Indicates the default setting

### Conventional / Extended Memory Size: (SW1-1 till SW1-4)

Select with SW1-1 through SW1-4 the amount of RAMPage memory to be used as conventional or extended memory. These settings are ignored if all RAMPage AT memory is used as expanded (paged) memory (SW2-1 through SW2-7 : OFF).

RAMPAGE CONVENTIONAL OR EXTENDED MEMORY SIZE	SETTING				RAMPAGE CONVENTIONAL OR EXTENDED MEMORY SIZE	SETTING			
	SW 1-1	SW 1-2	SW 1-3	SW 1-4		SW 1-1	SW 1-2	SW 1-3	SW 1-4
128KB *	ON	ON	ON	ON	1152KB	OFF	ON	ON	ON
256KB	ON	ON	ON	OFF	1280KB	OFF	ON	ON	OFF
384KB	ON	ON	OFF	ON	1408KB	OFF	ON	OFF	ON
512KB	ON	ON	OFF	OFF	1536KB	OFF	ON	OFF	OFF
640KB	ON	OFF	ON	ON	1664KB	OFF	OFF	ON	ON
768KB	ON	OFF	ON	OFF	1792KB	OFF	OFF	ON	OFF
896KB	ON	OFF	OFF	ON	1920KB	OFF	OFF	OFF	ON
1024KB	ON	OFF	OFF	OFF	2048KB	OFF	OFF	OFF	OFF

**Note:** \* Indicates the default setting



**I/O Base Address:** (SW1-5 till SW1-8)

If more than one RAMPAGE AT card is installed, each must be strapped for different I/O addresses.

I/O ADDRESSES USED (IN HEXADECIMAL)								SETTING			
BASE								SW1-5	SW1-6	SW1-7	SW1-8
0208	0209	4208	4209	8208	8209	C208	C209	ON	ON	ON	ON
0218	0219	4218	4219	8218	8219	C218	C219	ON *	ON *	ON *	OFF *
0258	0259	4258	4259	8258	8259	C258	C259	ON	OFF	ON	OFF
0268	0269	4268	4269	8268	8269	C268	C269	ON	OFF	OFF	ON
02A8	02A9	42A8	42A9	82A8	82A9	C2A8	C2A9	OFF	ON	OFF	ON
02B8	02B9	42B8	42B9	82B8	82B9	C2B8	C2B9	OFF	ON	OFF	OFF
02E8	02E9	42E8	42E9	82E8	82E9	C2E8	C2E9	OFF	OFF	OFF	ON

**Note:** \* Indicates default setting

#### Configuration DIP Switch 2

SWITCH 2	SETTING	FUNCTION
SW2-1 through SW2-7		CONVENTIONAL/EXTENDED (non-paged) MEMORY ALREADY INSTALLED, SEE NEXT TABLE
SW2-8	ON * OFF	PARITY CHECKING ENABLED PARITY CHECKING DISABLED

**Note:** \* Indicates default setting

#### Conventional/Extended memory already installed in system: (SW2-1 till SW2-7)

If all RAMPAGE memory is used as expanded (paged) memory, set the conventional/extended memory already installed to 16MB (SW2-1 through SW2-7 all OFF). If this is done, the settings for switches SW1-1 through SW1-4 are ignored.

**Note:** Do not count memory in the range from 640KB upto 1MB when determining the amount of Conventional/Extended (non-paged) memory.

CONV./ EXTENDED MEMORY ALREADY INSTALLED	SETTING						
(K.Bytes)	SW2-1	SW2-2	SW2-3	SW2-4	SW2-5	SW2-6	SW2-7
0	ON	ON	ON	ON	ON	ON	ON
128	ON	ON	ON	ON	ON	ON	OFF
256	ON	ON	ON	ON	ON	OFF	ON
384	ON	ON	ON	ON	ON	OFF	OFF
◦ 512	ON	ON	ON	ON	OFF	ON	ON
◦ 640	ON	ON	ON	ON	OFF	ON	OFF
768	ON	ON	ON	ON	OFF	OFF	ON
896	ON	ON	ON	ON	OFF	OFF	OFF
→ 1024	ON	ON	ON	OFF	ON	ON	ON
1152	ON	ON	ON	OFF	ON	ON	OFF
1280	ON	ON	ON	OFF	ON	OFF	ON
1408	ON	ON	ON	OFF	ON	OFF	OFF
1536	ON	ON	ON	OFF	OFF	ON	ON
1664	ON	ON	ON	OFF	OFF	ON	OFF
1792	ON	ON	ON	OFF	OFF	OFF	ON
1920	ON	ON	ON	OFF	OFF	OFF	OFF
2048	ON	ON	OFF	ON	ON	ON	ON
2176	ON	ON	OFF	ON	ON	ON	OFF
2304	ON	ON	OFF	ON	ON	OFF	ON
2432	ON	ON	OFF	ON	ON	OFF	OFF
◦ 2560	ON	ON	OFF	ON	OFF	ON	ON
2688	ON	ON	OFF	ON	OFF	ON	OFF
2816	ON	ON	OFF	ON	OFF	OFF	ON
2944	ON	ON	OFF	ON	OFF	OFF	OFF
3072	ON	ON	OFF	OFF	ON	ON	ON
3200	ON	ON	OFF	OFF	ON	ON	OFF
3328	ON	ON	OFF	OFF	ON	OFF	ON
3456	ON	ON	OFF	OFF	ON	OFF	OFF
3584	ON	ON	OFF	OFF	OFF	ON	ON
3712	ON	ON	OFF	OFF	OFF	ON	OFF
3840	ON	ON	OFF	OFF	OFF	OFF	ON
3968	ON	ON	OFF	OFF	OFF	OFF	OFF
4096	ON	OFF	ON	ON	ON	ON	ON
4224	ON	OFF	ON	ON	ON	ON	OFF
4352	ON	OFF	ON	ON	ON	OFF	ON
4480	ON	OFF	ON	ON	ON	OFF	OFF
4608	ON	OFF	ON	ON	OFF	ON	ON
4736	ON	OFF	ON	ON	OFF	ON	OFF
4864	ON	OFF	ON	ON	OFF	OFF	ON
4992	ON	OFF	ON	ON	OFF	OFF	OFF
5120	ON	OFF	ON	OFF	ON	ON	ON
5248	ON	OFF	ON	OFF	ON	ON	OFF
5376	ON	OFF	ON	OFF	ON	OFF	ON
5504	ON	OFF	ON	OFF	ON	OFF	OFF
5632	ON	OFF	ON	OFF	OFF	ON	ON
5760	ON	OFF	ON	OFF	OFF	ON	OFF
5888	ON	OFF	ON	OFF	OFF	OFF	ON

**Note:** Do not count memory in the range 640KB upto 1MB when determining the amount of conventional / extended memory already installed.

CONV./ EXTENDED MEMORY ALREADY INSTALLED	SETTING						
	(K.Bytes)	SW2-1	SW2-2	SW2-3	SW2-4	SW2-5	SW2-6
6016	ON	OFF	ON	OFF	OFF	OFF	OFF
6144	ON	OFF	OFF	ON	ON	ON	ON
6272	ON	OFF	OFF	ON	ON	ON	OFF
6400	ON	OFF	OFF	ON	ON	OFF	ON
6528	ON	OFF	OFF	ON	ON	OFF	OFF
6656	ON	OFF	OFF	ON	OFF	ON	ON
6784	ON	OFF	OFF	ON	OFF	ON	OFF
6912	ON	OFF	OFF	ON	OFF	OFF	ON
7040	ON	OFF	OFF	ON	OFF	OFF	OFF
7168	ON	OFF	OFF	OFF	ON	ON	ON
7296	ON	OFF	OFF	OFF	ON	ON	OFF
7424	ON	OFF	OFF	OFF	ON	OFF	ON
7552	ON	OFF	OFF	OFF	ON	OFF	OFF
7680	ON	OFF	OFF	OFF	OFF	ON	ON
7808	ON	OFF	OFF	OFF	OFF	ON	OFF
7936	ON	OFF	OFF	OFF	OFF	OFF	ON
8064	ON	OFF	OFF	OFF	OFF	OFF	OFF
8192	OFF	ON	ON	ON	ON	ON	ON
8320	OFF	ON	ON	ON	ON	ON	OFF
8448	OFF	ON	ON	ON	ON	OFF	ON
8576	OFF	ON	ON	ON	ON	OFF	OFF
8704	OFF	ON	ON	ON	OFF	ON	ON
8832	OFF	ON	ON	ON	OFF	ON	OFF
8960	OFF	ON	ON	ON	OFF	OFF	ON
9088	OFF	ON	ON	ON	OFF	OFF	OFF
9216	OFF	ON	ON	OFF	ON	ON	ON
9344	OFF	ON	ON	OFF	ON	ON	OFF
9472	OFF	ON	ON	OFF	ON	OFF	ON
9600	OFF	ON	ON	OFF	ON	OFF	OFF
9728	OFF	ON	ON	OFF	OFF	ON	ON
9856	OFF	ON	ON	OFF	OFF	ON	OFF
9984	OFF	ON	ON	OFF	OFF	OFF	ON
10112	OFF	ON	ON	OFF	OFF	OFF	OFF
10240	OFF	ON	OFF	ON	ON	ON	ON
10368	OFF	ON	OFF	ON	ON	ON	OFF
10496	OFF	ON	OFF	ON	ON	OFF	ON
10624	OFF	ON	OFF	ON	ON	OFF	OFF
10752	OFF	ON	OFF	ON	OFF	ON	ON
10880	OFF	ON	OFF	ON	OFF	ON	OFF
11008	OFF	ON	OFF	ON	OFF	OFF	ON
11136	OFF	ON	OFF	ON	OFF	OFF	OFF
11264	OFF	ON	OFF	OFF	ON	ON	ON
11392	OFF	ON	OFF	OFF	ON	ON	OFF
11520	OFF	ON	OFF	OFF	ON	OFF	ON
11648	OFF	ON	OFF	OFF	ON	OFF	OFF
11776	OFF	ON	OFF	OFF	OFF	ON	ON
11904	OFF	ON	OFF	OFF	OFF	ON	OFF

**Note:** Do not count memory in the range 640KB upto 1MB when determining the amount of conventional / extended memory already installed.



CONV./ EXTENDED MEMORY ALREADY INSTALLED	SETTING						
	(K.Bytes)	SW2-1	SW2-2	SW2-3	SW2-4	SW2-5	SW2-6
	12032	OFF	ON	OFF	OFF	OFF	ON
	12160	OFF	ON	OFF	OFF	OFF	OFF
	12288	OFF	OFF	ON	ON	ON	ON
	12416	OFF	OFF	ON	ON	ON	OFF
	12544	OFF	OFF	ON	ON	ON	ON
	12672	OFF	OFF	ON	ON	OFF	OFF
	12800	OFF	OFF	ON	ON	OFF	ON
	12928	OFF	OFF	ON	ON	OFF	OFF
	13056	OFF	OFF	ON	ON	OFF	ON
	13184	OFF	OFF	ON	ON	OFF	OFF
	13312	OFF	OFF	ON	OFF	ON	ON
	13440	OFF	OFF	ON	OFF	ON	OFF
	13568	OFF	OFF	ON	OFF	ON	ON
	13696	OFF	OFF	ON	OFF	ON	OFF
	13824	OFF	OFF	ON	OFF	OFF	ON
	13952	OFF	OFF	ON	OFF	OFF	OFF
	14080	OFF	OFF	ON	OFF	OFF	ON
	14208	OFF	OFF	ON	OFF	OFF	OFF
	14336	OFF	OFF	OFF	ON	ON	ON
	14464	OFF	OFF	OFF	ON	ON	OFF
	14592	OFF	OFF	OFF	ON	ON	ON
	14720	OFF	OFF	OFF	ON	ON	OFF
	14848	OFF	OFF	OFF	ON	OFF	ON
	14976	OFF	OFF	OFF	ON	OFF	OFF
	15104	OFF	OFF	OFF	ON	OFF	ON
	15232	OFF	OFF	OFF	ON	OFF	OFF
	15360	OFF	OFF	OFF	OFF	ON	ON
	15488	OFF	OFF	OFF	OFF	ON	OFF
	15616	OFF	OFF	OFF	OFF	ON	ON
	15744	OFF	OFF	OFF	OFF	ON	OFF
	15872	OFF	OFF	OFF	OFF	ON	ON
All RAMPage memory used as expanded (paged) memory		OFF OFF OFF	OFF OFF OFF	OFF OFF OFF	OFF OFF OFF	OFF OFF OFF	ON OFF OFF

**Note:** Do not count memory in the range 640KB to 1MB when determining the amount of conventional / extended memory already installed.



### 10.6.5. Installation / Maintenance AST RAMPAGE AT

This board plugs into an AT I/O slot. Ensure that there is no conflict with other memory in the system (SIMM or other options) when part of the available RAMPAGE memory is used as conventional/extended memory (selected by SW1). SW1 setting is ignored if all available memory is used as expanded (paged) memory (SW2-1 through SW2-7 OFF).

Up to four RAMPAGE boards can be installed. Run the SETUP command whenever the amount of conventional or extended memory has been changed.

#### **P3200-I:**

When AST RAMPAGE AT is installed then strap E6 on the main-board should be open (enable I/O slot refresh).

#### **P3200-II, P3202:**

When AST RAMPAGE AT is installed on a main-board using an 8MHz processor clock, strap W12 on the main board should be open (insert 1 wait state for RAM).

## 10.7. 4 / 8 MB MEMORY EXPANSION BOARD

### 10.7.1. Characteristics 4 / 8 MB Memory Expansion Board

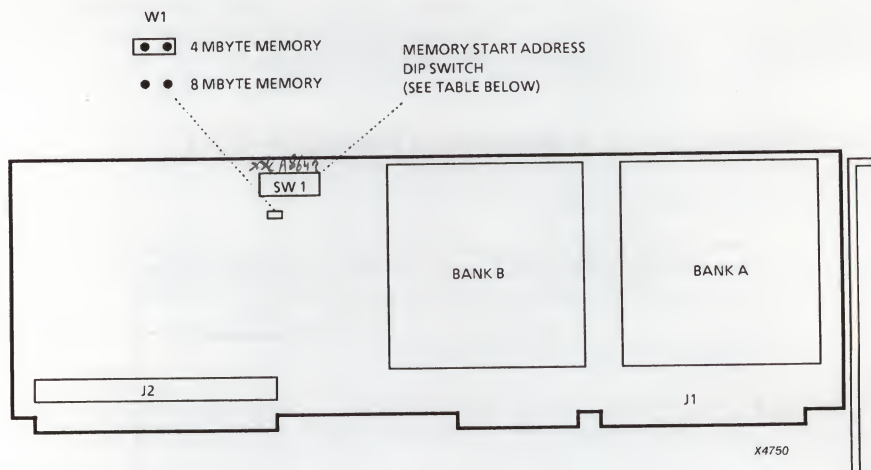
The 4 / 8 MB memory expansion board provides either 4 or 8 MB of high-speed, 32-bit, fast-page mode extended memory. A maximum of two such boards can be installed in a single system, permitting a total of 16 MB extended memory.

### 10.7.2. Connections 4 / 8 MB Memory Expansion Board

96-pin Memory Expansion Connector J2

PIN	SIGNAL NAME	PIN	SIGNAL NAME	PIN	SIGNAL NAME
A1	D0	B1	A2	C1	ADS-N
A2	D1	B2	A3	C2	BCTLEN-N
A3	D2	B3	A4	C3	M/IO-N
A4	D3	B4	A5	C4	W/RD-N
A5	D4	B5	A6	C5	MEMW-N
A6	D5	B6	A7	C6	MEMR-N
A7	D6	B7	A8	C7	REFRESH-N
A8	D7	B8	A9	C8	RDY-N
A9	D8	B9	A10	C9	HCLK
A10	D9	B10	A11	C10	ALE
A11	D10	B11	A12	C11	N.C.
A12	D11	B12	A13	C12	BIN-N
A13	D12	B13	A14	C12	LBE0-N
A14	D13	B14	A15	C14	LBE1-N
A15	D14	B15	A16	C15	LBE2-N
A16	D15	B16	A17	C16	LBE3-N
A17	D16	B17	A18	C17	LMEM1-N
A18	D17	B18	A19	C18	LMNA1-N
A19	D18	B19	A20	C19	BS321-N
A20	D19	B20	A21	C20	MRDY1-N
A21	D20	B21	A22	C21	LMEM2-N
A22	D21	B22	A23	C22	LMNA2-N
A23	D22	B23	A24	C23	BS322-N
A24	D23	B24	A25	C24	CLK2-N
A25	D24	B25	A26	C25	ENAPCHK-N
A26	D25	B26	A27	C26	I/OCHK-N
A27	D26	B27	SCDACK-N	C27	STNBY-N
A28	D27	B28	GA20	C28	BREFSH-N
A29	D28	B29	DC	C29	MREFSH-N
A30	D29	B30	A31	C30	MEM5
A31	D30	B31	GND	C31	MEM5
A32	D31	B32	GND	C32	MEM5

### 10.7.3. Strap Settings / Adjustments 4 / 8 MB Memory Expansion Board



SW1								MEMORY START ADDRESS
8	7	6	5	4	3	2	1	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	20000H 21
OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	40000H 41
OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	60000H 6
OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	80000H 8
OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	A0000H 10
OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	C0000H 12
OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	Not Used
ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Not Used

#### **10.7.5. Installation / Maintenance 4 / 8 MB Memory Expansion Board**

This board can be used only in the special 32-bit memory expansion slot connectors. A maximum of two such boards can be installed in one system. When two boards are installed in one system, the switch settings must be set so that the boards use different memory start addresses. When a board is used as a 4 MB memory expansion board, the memory chips must be installed in bank A (refer to 10.7.3.).





## 10.8. MICRON MB-28-DH

only for P3202  
see page 10.1-1

### 10.8.1. Characteristics Micron MB-28-DH

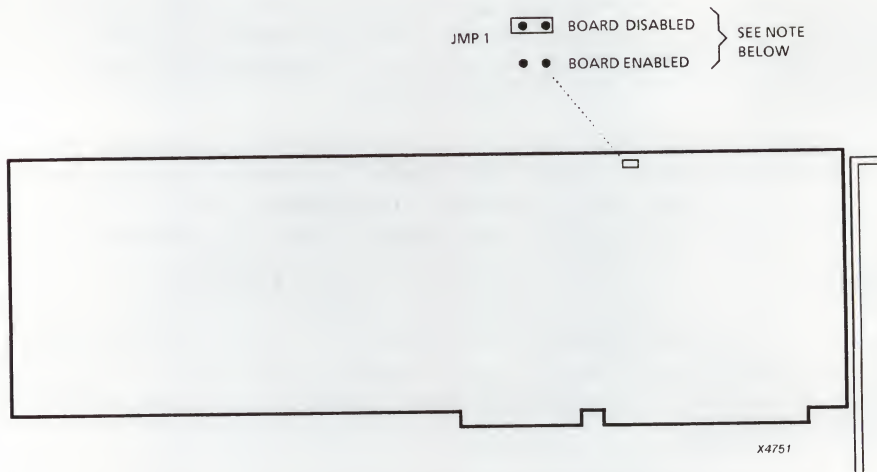
The Micron MB-28-DH is an option board to add more RAM. The board contains 2 MB of RAM. It is fully compatible with the Lotus/Intel/Microsoft Expanded Memory Specification (LIM/EMS) versions 3.2 and 4.0. It is also fully compatible with the Enhanced Expanded Memory Specification (EEMS).

The following brief description clarifies the usage of the terms **conventional**, **extended** and **expanded** memory. Memory from 0-640KB is referred to as **conventional** memory. Memory above 1MB is referred to as **extended** memory. A portion of the MB-28-DH board can be used to increase memory to 640 KB for computers that have less than 640KB of **conventional** memory installed on the motherboard. This is called **backfilling** memory. If more than one board is installed and backfilling is required, only the board using the highest memory address should be set for backfill. **Expanded** memory is divided into 16 KB blocks. This memory is accessed using bank switching, allowing memory blocks to be accessed via windows located within the 1 MB address range. This type of memory effectively allows programs to use more memory (see second note below).

**Notes:** For MS-DOS users: MS-DOS supports a maximum of 640 KB RAM (the conventional memory) for programs. Extended memory (if installed) can only be used as a RAMDISK or something similar.

EMS version 3.2 and the EEMS allow applications to access up to 8 MB of memory, EMS version 4.0 allows applications to access up to 32 MB of memory.

### 10.8.3. Strap Settings / Adjustments Micron MB-28-DH



**Note:** If more than one MB-28-DH board is installed in a system, remove JMP1 from all but one of the boards.

### 10.8.5. Installation / Maintenance Micron MB-28-DH

1. Turn off the system.
2. Remove the cover.
3. Remove the expansion slot cover.
4. Insert the MB-28-DH board into an AT-compatible option slot.
5. Secure the board by screwing the mounting bracket to the computer frame.
6. Replace the cover and turn the system on.
7. Run the INSTALL.EXE program provided with the utility diskette. This copies the files on the utility diskette to the startup drive, and modifies CONFIG.SYS (if required).
8. Run the MEMSETUP.EXE program to configure the MB-28-DH board for the configuration required. When configuring the frequency of operation and number of wait states, 8 MHz 1 wait state must be selected.

For further details of installation procedures and details of possible installation and run time errors, refer to the MICRON MB-28-DH Installation Guide delivered with every board.

## **10.9. INTEL 32-BIT MEMORY BOARD**

### **10.9.1. Characteristics Intel 32-bit Memory Board**

The Intel 32-bit memory board provides 8 Mbytes of option board memory, the memory on this board can be used only as extended memory. A maximum of two such boards can be installed in a single system, permitting a total of 16 Mbytes of option board memory.

### **10.9.2. Connections Intel 32-bit Memory Board**

The board has a standard 62-pin edge connector and a standard 36-pin edge connector. An additional 86-pin edge connector is provided for the 32-bit memory bus signals. This connector is detailed in the table on the following page.

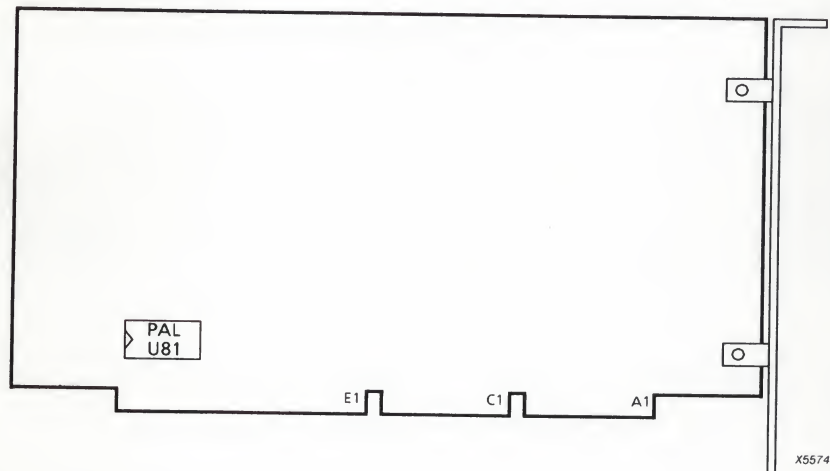


## 32-bit memory connector (86 pins)

PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
E1	GND	F1	+ 5 Vdc
E2	MD00	F2	MD01
E3	MD02	F3	MD03
E4	MD04	F4	MD05
E5	MD06	F5	MD07
E6	MD08	F6	MD09
E7	MD10	F7	MD11
E8	MD12	F8	MD13
E9	MD14	F9	MD15
E10	GND	F10	+ 5 Vdc
E11	MD16	F11	MD17
E12	MD18	F12	MD19
E13	MD20	F13	MD21
E14	MD22	F14	MD23
E15	MD24	F15	MD25
E16	MD26	F16	MD27
E17	MD28	F17	MD29
E18	MD30	F18	MD31
E19	GND	F19	+ 5 Vdc
E20	N.C.	F20	N.C.
E21	MBE01-N	F21	MBE00-N
E22	MBE03-N	F22	MBE02-N
E23	MA03	F23	MA02
E24	MA05	F24	MA04
E25	MA07	F25	MA06
E26	MA09	F26	MA08
E27	GND	F27	MA10
E28	MA11	F28	MA12
E29	MA13	F29	MA14
E30	MA15	F30	MA16
E31	MA25	F31	MA24
E32	MA27	F32	MA26
E33	SEL-N	F33	GND
E34	MLOCK-N	F34	MAS-N
E35	MMIO	F35	MCASSTB-N
E36	MDC	F36	MMRD-N
E37	MSCACCESS-N	F37	MFPAGE-N
E38	MKEN-N	F38	PAGESIZE-N
E39	MMEMSPEED1-N	F39	MMEMSPEED0-N
E40	GND	F40	+ 5 Vdc
E41	MMONGORDY-N	F41	MBREQ-N
E42	PARERR-N	F42	BUSPRI-N
E43	PERFORCE	F43	BGNT-N

### 10.9.3. Strap Settings / Adjustments Intel 32-bit Memory Board

There are no straps on the Intel 32-bit memory board. The drawing below shows the connector locations and pin-outs.



### 10.9.5. Installation / Maintenance Intel 32-bit Memory Board

This board can be used only in the special 32-bit memory expansion slot connectors. A maximum of two such boards can be installed in one system. The system automatically detects the new memory available, and will modify the extended memory field in the SETUP program to the new value.



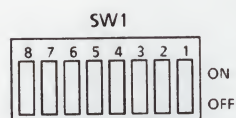
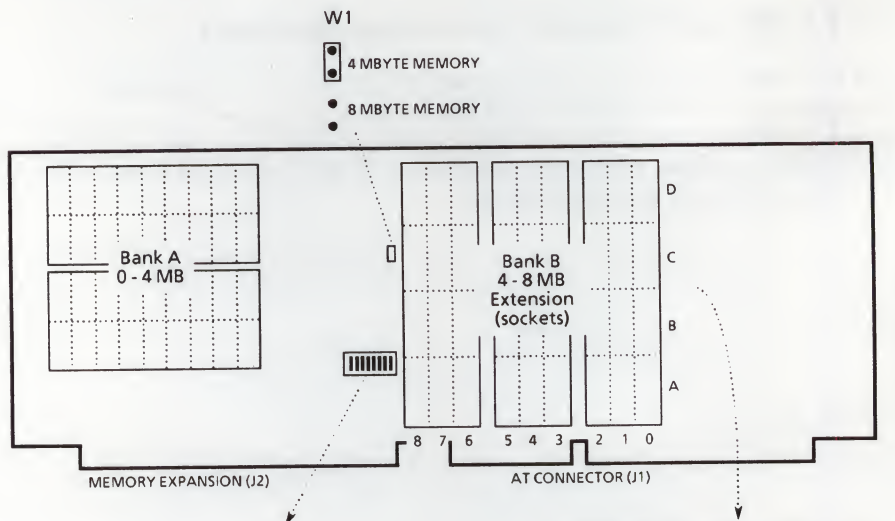
## **10.10. 4 / 8 MB MEMORY EXPANSION BOARD (IMC)**

### **10.10.1. Characteristics IMC Memory Expansion Board**

The 4 / 8 MB memory expansion board IMC (P9109-006 / 7) is designed for the 16 MC Motherboard IPB of the systems P9130 and P9160. It provides either 4 or 8 MB of high-speed, 32-bit, fast-page mode extended memory. A maximum of two such boards can be installed in a single system, permitting up to 16 MB of extended memory. The IMC memory board has no battery backup facility.



### 10.10.3. Strap Settings / Adjustments IMC Memory Expansion Board



1MB-CELL LOCATION (32x) (double word)	
Location	Bit
A0-A7	0-7 (LSB)
B0-B7	8-15
C0-C7	16-23
D0-D7	24-31 (MSB)
A8, B8, C8, D8	parity bit

SW1								MEMORY START ADDRESS	
8	7	6	5	4	3	2	1	Mbyte	Hexadecimal
OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	2	20 00 00
OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	4	40 00 00
OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	6	60 00 00
OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	8	80 00 00
OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	10	A0 00 00
OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	12	C0 00 00
OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	-	not used
ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	-	not used

#### 10.10.5. Installation / Maintenance IMC MB Memory Expansion Board

This board can be used only in the special 32-bit memory expansion slot connectors of the motherboard IPB (P9130 and P9160). A maximum of two such boards can be installed in one system. When two boards are installed in one system, the switch settings must be set so that the boards use different memory start addresses.

When the IMC board of 4 MB must be extended into a memory board of 8MB, memory chips must be installed on sockets (bank B). If the IMC board is extended to 8MB, strap W1 must be removed (refer to 10.10.3). The memory chips for the extension are available in the upgrade kit P9109-008.



## **10.11. MEMORY EXPANSION BOARD (IMD)**

### **10.11.1. Characteristics IMD Memory Expansion Board**

The IMD memory expansion board is designed for the EISA Mainboards. The total memory size depends on the mounted Single in Line Memory Modules (SIMMs). In total 4 pairs of SIMMs can be mounted on the IMD memory board. Possible SIMM types:

- 1 MB (single sided)
- 2 MB (double sided)
- 4 MB (single sided)
- 8 MB (double sided)

Depending on the SIMM type, the total memory size varies from 2 MB up to 64 MB.

### **10.11.5. Installation / Maintenance IMD Memory Expansion Board**

This board can be installed in one of the two memory slots of the EISA mainboard. A maximum of two IMD boards can be installed in one system. There are no straps for board selection.

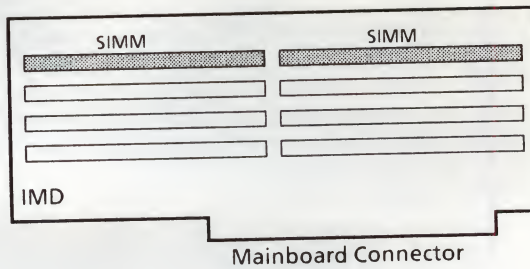
Before installing the IMD memory board into the system, first mount the SIMMs if necessary (see figure next page). Special care must be taken at handling of MOS ICs due to static charge.



## Mounting of SIMMs (preferred)

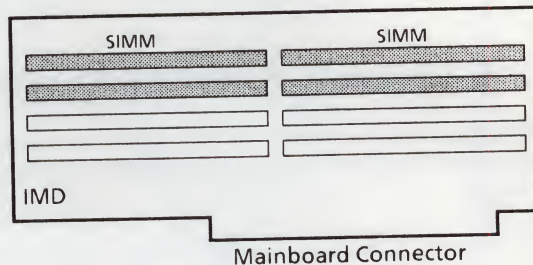
### 1 Pair of SIMMs (minimal)

total memory size is :  
2,4,8 or 16 MB  
(depending on type of SIMM)



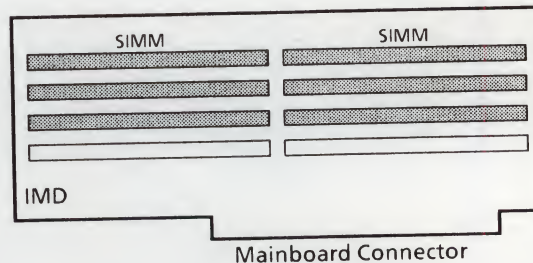
### 2 Pairs of SIMMs

total memory size is :  
4,8,16 or 32 MB  
(depending on type of SIMM)



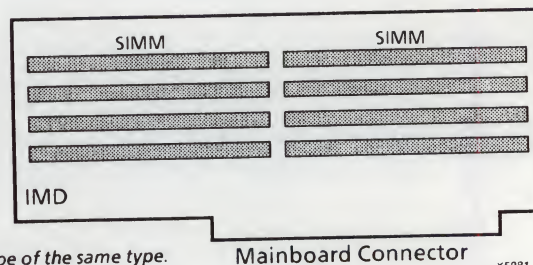
### 3 Pairs of SIMMs

total memory size is :  
6,12,24 or 48 MB  
(depending on type of SIMM)



### 4 Pairs of SIMMs (maximal)

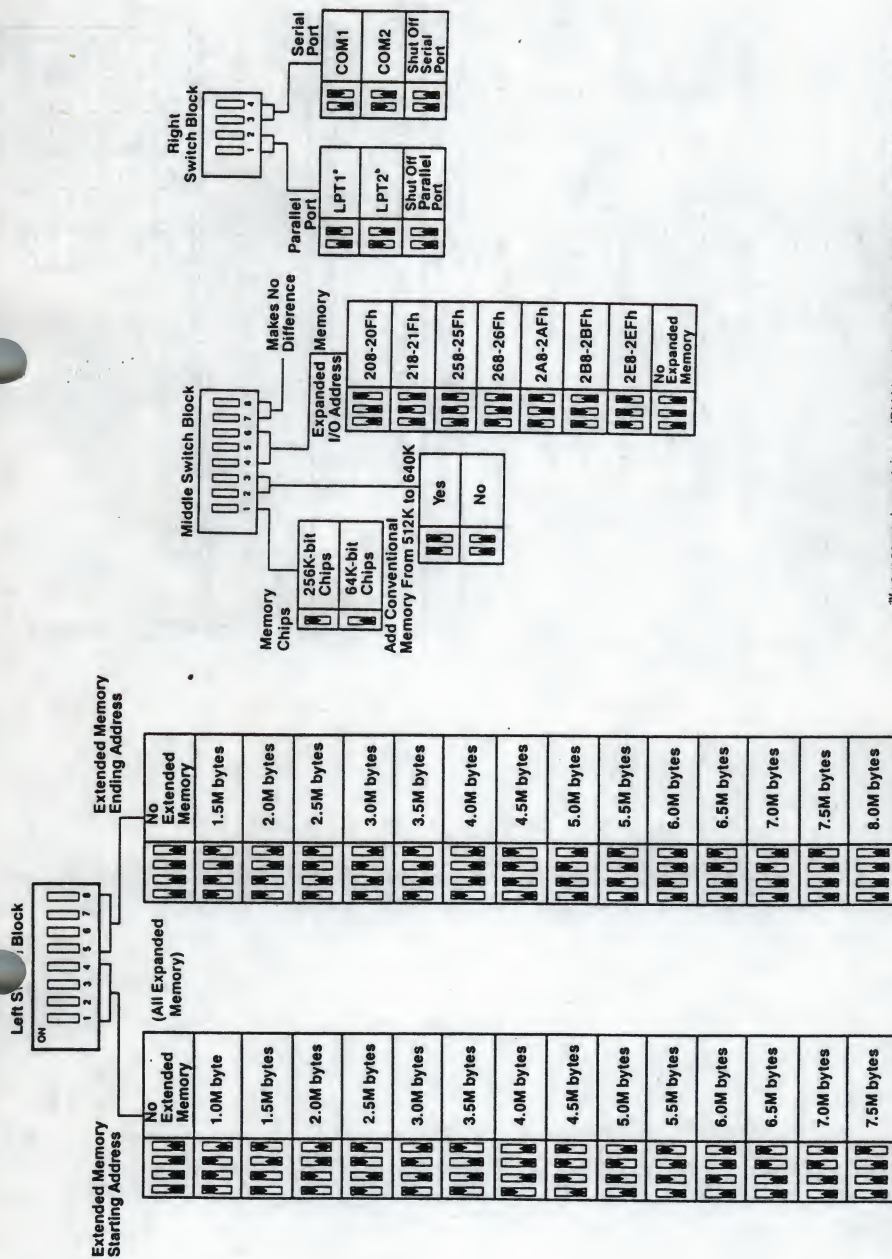
total memory size is :  
8,16,32 or 64 MB  
(depending on type of SIMM)



**NOTE :** SIMMs within a pair must be of the same type.  
Pairs can be of different type.

X5981

# intel ABOVE BOARD PS/AT

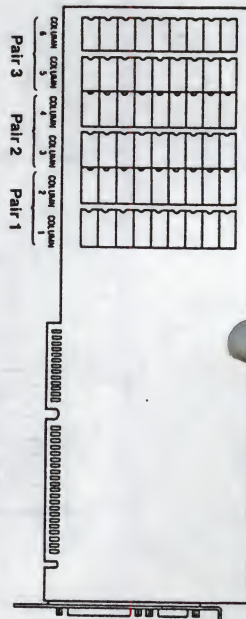


\*If your computer contains an IBM Monochrome Display Adapter or equivalent board, LPT1 is located on the display board. DOS refers to the Above Board's port as LPT2.  
 \*If your computer contains an IBM Monochrome Display Adapter or equivalent board, LPT1 is located on the display board. DOS refers to the Above Board's port as LPT3.

PC-0165

Most Common Setting

**Figure A-2 Settings for the Above™ Board switch blocks**



**Figure 3-2** Order for inserting chips

**Table 3-1** Chips that work on the Above™ Board PS/AT

Manufacturer	64K-bit chips	256K-bit chips
Fujitsu	MB8264-15 MB8264A-15	MB81256-12 MB81256-15
Hitachi	HM4864-2 HM4864-3	HM50256-12 HM50256-15
Mitsubishi	MSK4164-15 —	M5M4256-12 M5M4256-15
NEC	D4164-3 D4164-2	— —
Texas Instruments	TMS4164-15NL —	— —

info ABOVE BOARD 92/AT



## 12.1. TECHNICAL OVERVIEW

### 12.1.1. Option Cross Reference Guide

OPTION	P 2 1 2 0	P 2 2 3 0	A V E N G	P31xx					P32xx					P33xx							P 3 4 6 4	P 3 4 0 0	P91xx							
				0	0	0	0	2	0	0	0	0	3	3	0	0	4	4	5	6			7	0	3	3	6	6	7	0
				I	I	II			I	II																0	5	0	5	0
2: DCM Controller				X																										
3: Western Digital 1002S-WX2 / WX2A				X	X	X																								
4: Western Digital 1002A-WX1				X	X	X																								
5: CD-ROM Controller CM153	X	X	X	X	X	X	X	X		X	X	X																		
6: Western Digital 1002-WA2									X	X	X																			
7: Western Digital 1003-WA2									X	X			X	X								X								
8: Western Digital 1003A-WA2										X	X			X								X								
9: Western Digital 1003V-SM2										X	X	X		X	X							X								
10: XT Storage Adapter						X																								
11: AT Storage Adapter											X																			
12: Adaptec ACB-2322X																	X	X					X		X	X				
13: Western Digital 1003V-MM2											X			X	X							X								
14: Adaptec AHA-1542X																								X				X		
15: Mitac Hard Disk Adapter																X														
16: External Boot Option																								X		X				
17: Ultra 12(F) ESDI Controller																	X	X	X											
18: Mylex SCSI Controller																						X								



## 12.1.2. Technical Data

HARD DISK CONT. PART	DCM Controller	WD 1002S-WX2 / WX2A	WD 1002A-WX1	CD-ROM CM153
Interface	ST 506	ST 506	ST 506	RS422 Ext. TTL Int.
Encoding Method	MFM	MFM	MFM	
Cyl Drive (max)	Variable	1024	1024	
Sectors Track (max)	32	17	17	
Bytes Sector (max)	256	512	512	
Heads (max)	16	16	16	
Nr of Drive Selects	1	2	2	1 × External 1 × Internal
Stepping Rates	Variable	70 us 200 us 3ms	10 us 3ms	
Data Transfer Rate	5Mb/s	5Mb/s	5Mb/s	
Write Precomp Time	+/-12 ns	+/-12 ns	+/-12 ns	
Sectoring	Soft	Soft	Soft	
Used Interrupt		IRQ2, 5	IRQ2, 5	
I/O Address	30x	320-323 or 324-327	320-323 or 324-327	300 or 310 or 330 or 340
<b>FLEX DISK CONT. PART</b>	n.a.	n.a.	n.a.	n.a.
Interface				
Encoding Method				
Heads (max)				
Nr of Drive Selects				
Data Transfer Rate (Kbs)				
Write Precomp Time 500.250.125 kbs 300 kbs				
Sectoring				
Max Cable Lenth (m)				
Used Interrupt				
DMA Channel				
I/O Address				
<b>GENERAL</b>				
Power Requirements +5 VDC (A) +12 VDC (mA) -12 VDC (mA)	1.5 100	0.8 10	0.8 10	0.20
Dimensions l × h (mm)		205 × 107	127 × 100	140 × 90

HARD DISK CONT. PART	WD 1002-WA2	WD 1003-WA2	WD 1003A-WA2	WD 1003V-SM2	WD 1003V-MM2
Interface	ST 506/ST 412	ST 506/ST 412	ST 412/SQ312RD	ST 412	ST 412
Encoding Method	MFM	MFM	MFM	MFM/RLL	MFM/RLL
Cyl / Drive (max)	1024	2048	2048	2048	2048
Sectors / Track (max)	17	17	17	17/26	17/26
Bytes / Sector (max)	512	512	512	512	512
Heads (max)	16	16	16	16	16
Nr of Drive Selects	2	2	2	2	2
Stepping Rates	35us. or .5ms till 7.5 ms with .5ms incr.	3.2/16/35us, or .5ms till 6.5 ms with .5ms incr.	3.2/16/35us, or .5ms till 6.5 ms with .5ms incr.		
Data Transfer Rate	5Mb/s	5Mb/s	5Mb/s	5Mb/s / 7.5 Mb/s	5Mb/s / 7.5 Mb/s
Write Precomp Time	+/-12 ns	+/-12 ns	+/-12 ns		
Sectoring	Soft	Soft	Soft	Soft	Soft
Used Interrupt	IRQ14	IRQ14	IRQ14	IRQ14	IRQ14
I/O Address	1F0-1F7 or 170-177	1F0-1F7 or 170-177	1F0-1F7 or 170-177	1F0-1F7 or 170-177	1F0-1F7 or 170-177
<b>FLEX DISK CONT. PART</b>					
Interface	ST450/TEAC 55F/G	ST450/TEAC 55F/G	ST450/TEAC 55F/G	ST450/TEAC 55F/G	ST450/TEAC 55F/G
Encoding Method	FM or MFM	FM or MFM	FM or MFM	FM or MFM	FM or MFM
Heads (max)	2	2	2	2	2
Nr of Drive Selects	2	2	2	2	2
Data Transfer Rate (Kbs)	125, 250, 300, 500	125, 250, 300, 500	125, 250, 300, 500	125, 250, 300, 500	125, 250, 300, 500
Write Precomp Time 500,250,125 kbs 300 kbs	+/-125ns +/-208ns	+/-125ns +/-208ns	+/-125ns +/-208ns	+/-125ns +/-208ns	+/-125ns +/-208ns
Sectoring	soft	soft	soft	soft	soft
Max Cable Lenth (m)	3	3	3	3	3
Used Interrupt	IRQ6	IRQ6	IRQ6	IRQ6	IRQ6
DMA Channel	DRQ2	DRQ2	DRQ2	DRQ2	DRQ2
I/O Address	3F0-3F7 or 370-377	3F0-3F7 or 370-377	3F0-3F7 or 370-377	3F0-3F7 or 370-377	3F0-3F7 or 370-377
<b>GENERAL</b>					
Power Requirements + 5 VDC (A) + 12 VDC (mA) -12 VDC (mA)	2.5 150 10	1.2 20 10	1.2 20 10	1.2 20	
Dimensions l x h (mm)	333 x 122	333 x 122	333 x 107	211 x 98	

**Note:** The number of cylinders and sectors used depends on the BIOS program used in the system.

HARD DISK CONT. PART	AT STORAGE ADAPTER	XT STORAGE ADAPTER	MITAC HARD DISK ADAPTER
Used Interrupt	IRQ14	IRQ5	IRQ14
I/O Address	1F0-1F7 or 170-177	1F0-1F7 or 170-177	1F0-1F7 or 170-177
DMA Channel		DRQ3	
FLEX DISK CONT. PART			
Used Interrupt	IRQ6		
DMA Channel	DRQ2		
I/O Address	3F0-3F7		



HARD DISK CONT. PART	ADAPTEC ACB-2322X	ADAPTEC AHA-1542X	ULTRA 12(F) ESDI Controller	MYLEX DCE376 SCSI Contr.
Interface	ESDI	SCSI	ESDI	SCSI
Encoding Method	NRZ			
Cyl / Drive (max)	4096		4096	
Sectors / Track (max)	17.63		127	
Bytes / Sector (max)	512			
Heads (max)	16		16	
Nr of Drive Selects	2		2	
Data Transfer Rate	Up to 15 Mb/s	5.0 Mb/s (synchronous)	10, 15 or 20 Mb/s	
Buffer Size	32 or 64 Kbytes		8 KB or 32 KB	
Used Interrupt	IRQ10, 11, 12, 14 or 15	IRQ9, 10, 11, 12, 14 or 15	IRQ 14, 15	IRQ 14
DMA Channel	DRQ5, 6 or none	DRQ0, 5, 6 or 7		
I/O Address	1F0-1F7 or 170-177	130, 134, 230, 234, 330 or 334	1F0-1F7 or 170-177	
<b>FLEX DISK CONT. PART</b>				
Interface	ST450/TEAC 55F.G	ST450/TEAC 55F.G		
Encoding Method	FM or MFM	FM or MFM		
Heads (max)	2	2		
Nr of Drive Selects	2	2	3	
Data Transfer Rate (Kbs)	125, 250, 300, 500	125, 250, 300, 500	250, 300, 500	
Write Precomp Time 500,250,125 kbs 300 kbs	+/-125ns +/-208ns	+/-125ns +/-208ns	125ns, 208ns, 250ns	
Sectoring	Soft	Soft		
Max Cable Lenth (m)	3	3		
Used Interrupt	IRQ6 or 10	IRQ6 or 10		
DMA Channel	DRQ2 or 3	DRQ2 or 3		
I/O Address	3F0-3F7 or 370-377	3F0-3F7 or 370-377	3F0-3F7 or 370-377	3F0-3F7 or 370-377
<b>GENERAL</b>				
Power Requirements + 5 VDC (A) + 12 VDC (mA) - 12 VDC (mA)	1.7 90 50	1.4		
BIOS address	C8000, CC000 or disabled	C8000, CC000, D8000, DC000 or disabled	C8000, CC000, D0000, D4000, D8000, DC000 or disabled	
Dimensions l x b x h (mm)	330 x 100 x 19	337x105x13	203x100x15	





## **12.2. DCM CONTROLLER**

### **12.2.1. Characteristics DCM Controller**

The DCM Controller is a hard disk controller, capable of controlling one drive.

### 12.2.2. Connections DCM Controller

#### Control Signal Connector J1

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	REDUCE WRITE CURRENT-N
3	4	HEAD SELECT 2 <sup>1</sup> 2-N
5	6	WRITE GATE-N
7	8	SEEK COMPLETE-N
9	10	TRACK ZERO-N
11	12	WRITE FAULT-N
13	14	HEAD SELECT 2 <sup>1</sup> 0-N
15	16	N.C.
17	18	HEAD SELECT 2 <sup>1</sup> 1-N
19	20	INDEX-N
21	22	READY-N
23	24	STEP-N
25	26	DRIVE SELECT 0-N
27	28	N.C.
29	30	N.C.
31	32	N.C.
33	34	DIRECTION IN-N

#### Data Signal Connector J2

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	N.C.	2	GROUND
3	N.C.	4	GROUND
5	N.C.	6	GROUND
7	N.C.	8	GROUND
9	N.C.	10	N.C.
11	N.C.	12	GROUND
13	+ MFM WRITE DATA	14	-MFM WRITE DATA
15	GROUND	16	GROUND
17	+ MFM READ DATA	18	-MFM READ DATA
19	GROUND	20	GROUND

12.2-3



#### 12.2.4. Modification History DCM Controller

SI-NR	SUBJECT
P3100-005	Strap settings if seagate ST412, Miniscribe 2012 or 3012 installed
P3100-009	Intermittent failure on harddisk subsystem

## 12.3. WESTERN DIGITAL 1002S-WX2 / WX2A

### 12.3.1. Characteristics Western Digital 1002S-WX2 / WX2A

The Western Digital 1002S-WX2 / WX2A is a short form hard disk controller capable of controlling one or two Hard disk drives. In a two drive configuration it is possible to connect two drives of different types.

### 12.3.2. Connections Western Digital 1002S-WX2 / WX2A

Control Signal Connector J1

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	REDUCE WRITE CURRENT-N
3	4	HEAD SELECT 2 <sup>2</sup> -N
5	6	WRITE GATE-N
7	8	SEEK COMPLETE-N
9	10	TRACK ZERO-N
11	12	WRITE FAULT-N
13	14	HEAD SELECT 2 <sup>0</sup> -N
15	16	N.C.
17	18	HEAD SELECT 2 <sup>1</sup> -N
19	20	INDEX-N
21	22	READY-N
23	24	STEP-N
25	26	DRIVE SELECT 1-N
27	28	DRIVE SELECT 2-N
29	30	N.C.
31	32	N.C.
33	34	DIRECTION IN-N

When installing a two drive system, use two data signal cables and one control signal cable with two parallel edge connectors. The drives must be strapped for radial seek disabled (if the drive has this option), and one drive select as drive 1, the other as drive 2.

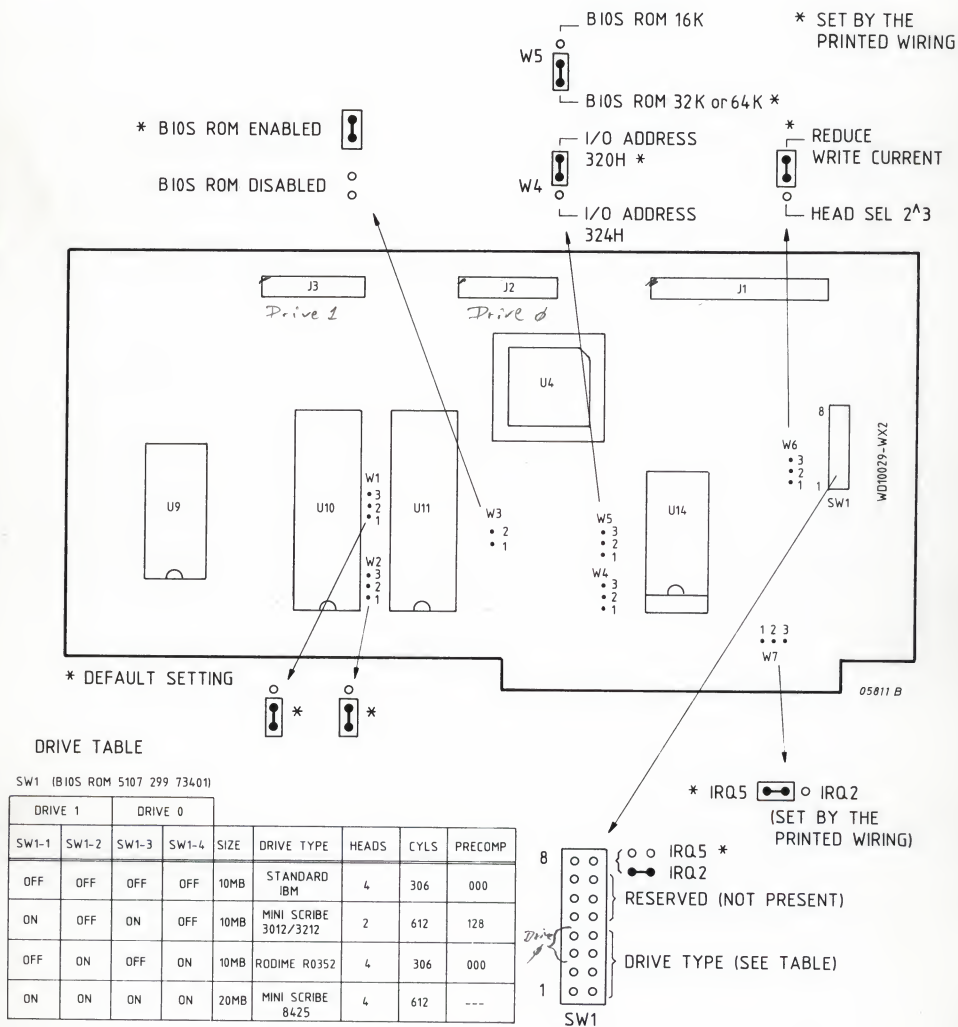
## Data Signal Connectors J2, J3

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	N.C.	2	GROUND
3	N.C.	4	GROUND
5	N.C.	6	GROUND
7	READY LINE DRIVE	8	KEY
9	N.C.	10	GROUND
11	N.C.	12	GROUND
13	+MFM WRITE DATA	14	-MFM WRITE DATA
15	GROUND	16	GROUND
17	+MFM READ DATA	18	-MFM READ DATA
19	GROUND	20	GROUND

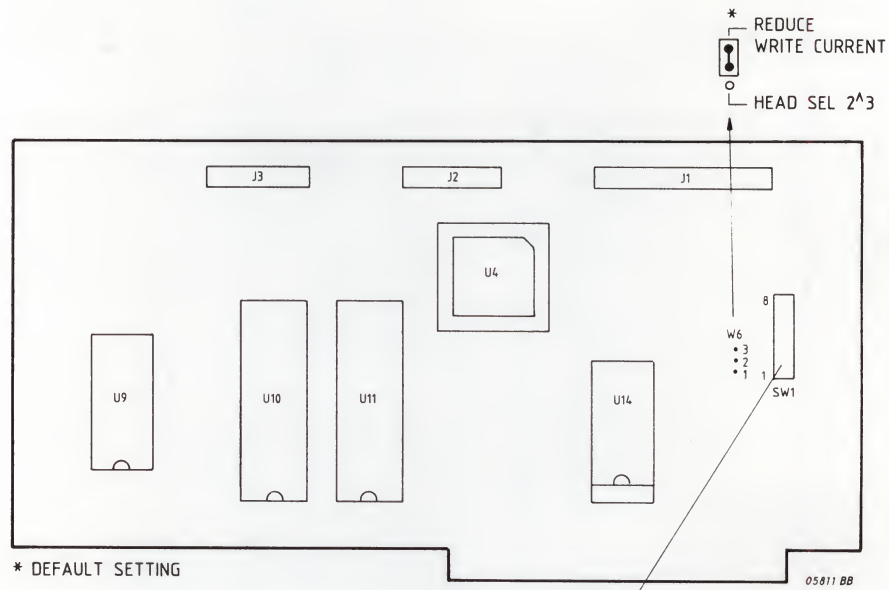
There are two data signal connectors, one for each drive. Connector J2 is for drive 0, connector J3 is for drive 1.

### 12.3.3. Strap Settings / Adjustments Western Digital 1002S-WX2 / WX2A

#### Strap Settings 1002S-WX2



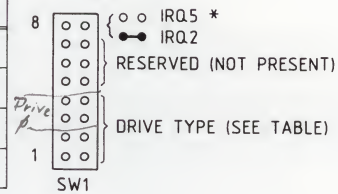




DRIVE TABLE

SW1

DRIVE 1				DRIVE 0				SIZE	DRIVE TYPE	HEADS	CYLS	PRECOMP
SW1-1	SW1-2	SW1-3	SW1-4	SW1-1	SW1-2	SW1-3	SW1-4					
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	10MB	STANDARD IBM	4	306	128
ON	OFF	ON	OFF	ON	OFF	ON	OFF	10MB	MINI SCRIBE 3012/3212	2	612	128
OFF	ON	OFF	ON	OFF	ON	OFF	ON	10MB	RODIME R0352	4	306	128
ON	ON	ON	ON	ON	ON	ON	ON	20MB	MINI SCRIBE 8425	4	612	612



#### 12.3.4. Modification History Western Digital 1002S-WX2 / WX2A

SI-NR	SUBJECT
P3100-013	Introduction Hard Disk Controller WX2
P3100-036	New BIOS ROM for WX2 hard disk controller 5107 299 73401

The 1002S-WX2 has ROM version 5107 299 73401

MODIFICATION	FOR CHANGE/PROBLEM	REFER TO	EFFECTIVE FROM:
U9, U10	I.C. version incompatibility	see below	initial production

**Important note:**

*It is possible that there may be boards on which I.C.'s U9 and U10 are not compatible, resulting in board failure. Check against the figure below if you have problems, and return any incorrect boards to the workshop.*

The fault occurs when U9 is version C or E, and U10 is version 05-05

U9 

WD10C20
(0)X-

 X = Version

U10 

WD1010
XX-XX

 XX-XX = Version

#### 12.3.5. Installation / Maintenance Western Digital 1002S-WX2 / WX2A

The 1002S-WX2 / WX2A may be installed in any of the option board slots. If it is to be installed in a system with a 5 slot main PCB it should be installed in one of the slots nearest the power supply, with the mounting bracket top removed to allow for the top of the rear panel of the system cabinet.

Check the strap settings when installing. The connectors J1, J2 and J3 are not keyed, so to ensure that the drive cable connectors are plugged in correctly, check the reverse of the board, pin 1 of each connector has a square solder pad.





system series: P3100

model:

main assy:

nr. P3100-013

date: 850610 revised:

title: Introduction Hard Disk Controller WX2.

## note:

The new Hard Disk versions of the P3100 are equipped with a new controller from Western Digital, the WX2 controller.  
This controller has a number of advantages above the existing DCM board:  
Booting from hard disk, IBM compatibility, faster.

The first deliveries of these controllers have shown some problems which will we will list below for your information:

## 1 DISK BIOS ROM (U14)

The on-board BIOS ROM, coded as 62-00042-10, is initially shipped with some failures:

- a ROM with no date stamped may be a version which is not customized for Philips. Our hard disk is not accessible with this ROM, you have to order a new ROM for these versions.
- a ROM dated with 15-3-85 will cause a 1701 error at power-on, due to the long turn-on delay of the drive.

In IBM systems this is not detected because of the long inside test of these systems.

The problem is solved by changing two values in the ROM, which can be checked by loading DEBUG and examine location C800:00F5H and C800:00FFH.  
Location 00F5 must be changed from 01 to 03H.  
Location 00FF must be changed from 36 to 34H.

A new ROM can be ordered at:

Mr. C.G. de Roover  
Dept. DSS/MM

Apeldoorn

Refer to WX2 BIOS ROM, 12NC 8122 189 04111.

This ROM includes all these fixes.

## 2 INCOMPATIBILITY U9, U10

It is possible to find some boards in the field with a wrong combination of chips on location U9 and U10.

If U9 is a WD 10C20 version 0C- or 0E- then it is not allowed to have a U10 chip WD 1010 of version 05-05.

All other combinations are possible.





## 3 STRAPPING

The next straps should be set according to the used drive type, for the first fixed disk:

## SWITCH 1

STRAP 3	STRAP 4	TYPE	HEAD	CYLS
OFF	OFF	MINISCRIBE 2012	4	306
ONN	OFF	MINISCRIBE 3012/3212	2	612

## 4 DOCUMENTATION

An update package of the CE Manual can be ordered at DSS/SDT att  
Mr. Esenkbrink with reference to number UP 85/49.

## 12.4. WESTERN DIGITAL 1002A-WX1

### 12.4.1. Characteristics Western Digital 1002A-WX1

The Western Digital 1002A-WX1 is a short form hard disk controller with small dimensions capable of controlling one or two drives. In a two drive configuration it is possible to connect two drives of different types.

### 12.4.2. Connections Western Digital 1002A-WX1

Control Signal Connector J1

GROUND RETURN	SIGNAL	SIGNAL NAME
1	2	REDUCE WRITE CURRENT-N or HEAD SELECT 2 <sup>3</sup> -N
3	4	HEAD SELECT 2 <sup>2</sup> -N
5	6	WRITE GATE-N
7	8	SEEK COMPLETE-N
9	10	TRACK ZERO-N
11	12	WRITE FAULT-N
13	14	HEAD SELECT 2 <sup>0</sup> -N
15	16	N.C.
17	18	HEAD SELECT 2 <sup>1</sup> -N
19	20	INDEX-N
21	22	READY-N
23	24	STEP-N
25	26	DRIVE SELECT 1-N
27	28	DRIVE SELECT 2-N
29	30	N.C.
31	32	N.C.
33	34	DIRECTION IN-N

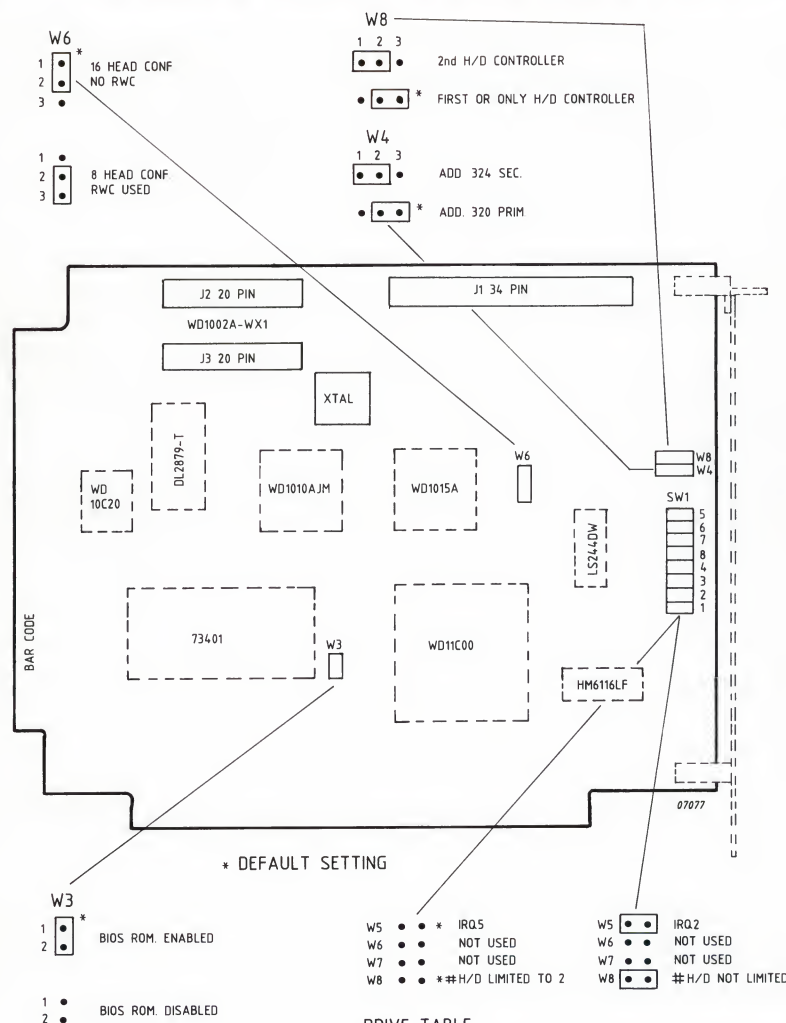
When installing a two drive system, use two data signal cables and one control signal cable with two parallel edge connectors (daisy chain). The drives must be strapped for radial seek disabled (if the drive has this option), and one drive select as drive 1, the other as drive 2.

## Data Signal Connectors J2, J3

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	N.C.	2	GROUND
3	N.C.	4	GROUND
5	N.C.	6	GROUND
7	READY LINE DRIVE	8	GROUND
9	N.C.	10	N.C.
11	N.C.	12	GROUND
13	+ MFM WRITE DATA	14	-MFM WRITE DATA
15	GROUND	16	GROUND
17	+ MFM READ DATA	18	-MFM READ DATA
19	GROUND	20	GROUND

There are two data signal connectors, one for each drive. Connector J2 is for drive 0, connector J3 is for drive 1.

### 12.4.3. Strap Settings / Adjustments Western Digital 1002A-WX1



#### DRIVE TABLE

SW1 (BIOS ROM 5107 299 73401) (Same as on -WX2)

DRIVE 1		DRIVE 0		SIZE	DRIVE TYPE	HEADS	CYLS	PRECOMP
SW1-1	SW1-2	SW1-3	SW1-4					
OFF	OFF	OFF	OFF	10MB	STANDARD IBM	4	306	128
ON	OFF	ON	OFF	10MB	MINI SCRIBE 3012/3212	2	612	128
OFF	ON	OFF	ON	10MB	RODIME R0352	4	306	128
ON	ON	ON	ON	20MB	MINI SCRIBE 8425	4	612	612



#### 12.4.4. Modification History Western Digital 1002A-WX1

SI-NR	SUBJECT
P3100-054	Initial release (H/D controller 1002A-WX1)

The 1002A-WX1 has ROM version 5107 299 73401

#### 12.4.5. Installation / Maintenance Western Digital 1002A-WX1

The 1002A-WX1 may be installed in any of the option board slots. If it is to be installed in a system with a 5 slot main PCB it should be installed in one of the slots nearest the power supply, with the mounting bracket top removed to allow for the top of the rear panel of the system cabinet.

Check the strap settings when installing. The connectors J1, J2 and J3 are not keyed, so to ensure that the drive cable connectors are plugged in correctly, check the reverse of the board, pin 1 of each connector has a square solder pad.

## 12.5. CD-ROM CONTROLLER CM153

### 12.5.1. Characteristics CM153

The CM153 is a CD-ROM controller capable of handling either one externally or one internally installed drive. Commands are given via a 8251 UART. RS422 signals are used for the external drive. The internal drive uses TTL level signals. The controller supports only one drive at a time. The communication is serial with a transfer rate of 19200 Baud.

### 12.5.2. Connections CM153

External Connector X3 (15-pin D connector, female)

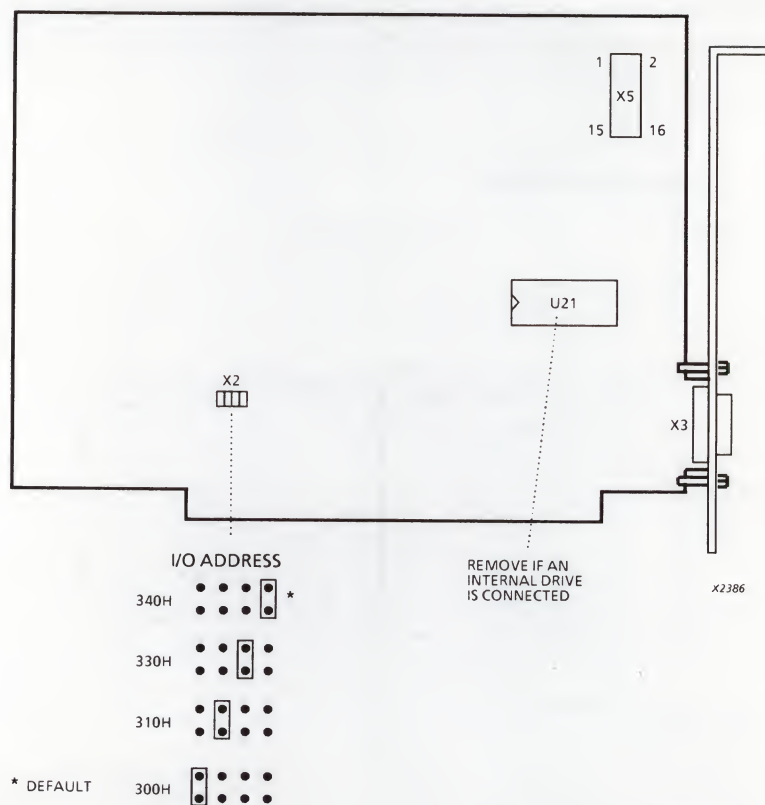
PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	RESPONSE +	9	ATTENTION +
2	RESPONSE -	10	ATTENTION -
3	COMMAND +	11	Drive Maint.
4	COMMAND -	12	Drive Maint.
5	DATA +	13	Drive Maint.
6	DATA -	14	Drive Maint.
7	CLOCK +	15	GROUND
8	CLOCK -		

**Note:** The signals "Drive Maint." are for drive maintenance only.

Internal Connector X5

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	RESPONSE	2	GROUND
3	COMMAND	4	GROUND
5	DATA	6	+ 5 VDC
7	DATA CLOCK	8	+ 5 VDC
9	ATTENTION	10	+ 5 VDC
11	Maintenance for drive only	12	Maintenance for drive only
13	Maintenance for drive only	14	Maintenance for drive only
15	GROUND	16	GROUND

### 12.5.3. Strap Settings / Adjustments CM153



## 12.5.5. Installation / Maintenance CM153

### Hardware installation CM153

The CM153 may be installed in any of the expansion slots. Ensure that there is no conflict in board I/O address used with any other options installed. The controller has a single 15-pin sub-miniature D-type connector to connect an external CD-ROM Drive via and RS422 type of interface. The 16-pin internal connector can be interfaced to an internal CD-ROM Drive via a TTL type interface. However, it is not possible to have them both connected. If an internal drive is used, U21 (mounted on a socket) should be removed. It is possible to install up to four controllers. The selected device addresses must be different.

### Software installation CM153

Depending on which CD-ROM disk is to be used, a device driver has to be installed. Because of different CD-ROM formats in the early days there were a lot of device drivers, almost every application had its own device driver for every system. The defacto standard since 1986 is the High Sierra standard. This standard defines the logical organization of files on the CD-ROM disk (the physical standard was already defined in the yellow book, 1983).

### Software installation High Sierra format

To retrieve data from the CD-ROM disk, a device driver is required, which in most cases is the HS153.SYS file. This device driver must be installed in the system during booting by adding the following line to the CONFIG.SYS file:

**DEVICE = HS153.SYS /D:CDROM1 /P:340**

The /D option assigns the name/handle for the CD-ROM drive (like CON, LPT, etc.), so the system software can identify it. The /P option specifies the I/O address of the interface. This number must comply with the jumper setting on the CM153 CD-ROM controller.

The next step is to load a memory resident program called MSCDEX.EXE, which is short for MicroSoft CD-ROM EXtensions. This program 'fools' MS-DOS into believing that the CD-ROM drive is one big hard disk without the limitations of the 32 Mbyte partitions. The best way to do this is to include the following command in the AUTOEXEC.BAT file:

**C:\MSCDEX /D:CDROM1 /M:12 /L:Z /E**

The /D parameter defines the name of the CD-ROM drive and must be the same as the one chosen in the CONFIG.SYS file. /M tells MSCDEX how many specific buffers to allocate. These buffers take up 2 Kbytes each and are not the same as the BUFFERS command in CONFIG.SYS. The /L parameter specifies the drive letter which MSCDEX allocates to the CD-ROM drive (in this case Z:) and /E should be used if the system uses expanded memory. These last two parameters are optional.



## Software intallation Non High Sierra format.

Some applications do not use the MS-DOS extensions and require another device driver to be installed (mostly older CD-ROM disks). The documentation supplied with the application should make it clear what kind of format is on the CD-ROM disk (High Sierra or NON High Sierra). In case of Non High Sierra format on the disk, we must use the other device driver called CM153.SYS. This driver should now be included in the CONFIG.SYS file instead of HS153.SYS. This is done by adding the following line to the CONFIG.SYS file:

**DEVICE = CM153.SYS 340**

A second device driver called MDCM100.SYS now 'fools' MS-DOS into believing that the CD-ROM is one big hard disk. This driver can be installed only after CM153.SYS is installed in the CONFIG.SYS file as follows

**DEVICE = MDCM100.SYS**

The next available drive letter will then be assigned to the CD-ROM drive.

### Installing Multiple CM153 Controllers

Installing more then one controller is done by adding one or more device I/O addresses to the "device =" line in the CONFIG.SYS file. For example, when installing two CM153 controllers at addresses 340H and 330H, insert the next line in the CONFIG.SYS file:

**DEVICE = HS153.SYS /D:CDROM1 /P:340 330**

or

**DEVICE = CM153.SYS 340 330**

Depending on which format your CD-ROM disk has.

### Maintenance

The controller needs no preventive maintenance and no repair on component level is done. When a unit is defective, replace the defective unit.

**Note:** *If a CD-ROM drive uses a caddy to insert a CD-ROM disk, make sure that the disk is inserted into the caddy in the correct position with the label facing up. The caddy can be inserted into the drive in one position only.*

## 12.6. WESTERN DIGITAL 1002-WA2

### 12.6.1. Characteristics Western Digital 1002-WA2

The Western Digital 1002-WA2, is a general purpose Disk Controller Device that interfaces up to two Winchester Hard Disks and up to two Floppy disk Drives.

### 12.6.2. Connections Western Digital 1002-WA2

Flexible Drive Signal Connector J1

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	WRITE CURRENT CONTROL-N
3	4	N.C.
No Pin 5	6	N.C.
7	8	INDEX-N
9	10	MOTOR ON 1-N
11	12	DRIVE SELECT 2-N
13	14	DRIVE SELECT 1-N
15	16	MOTOR ON 2-N
17	18	DIRECTION-N
19	20	STEP-N
21	22	WRITE DATA-N
23	24	WRITE GATE-N
25	26	TRACK 0-N
27	28	WRITE PROTECT-N
29	30	READ DATA-N
31	32	SIDE SELECT-N
33	34	DISKETTE CHANGE-N

# Hard Disk Drive Control Interface Connector J5

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	HEAD SELECT 2 <sup>3</sup> -N or REDUCED WRT CURRENT-N
3	4	HEAD SELECT 2 <sup>2</sup> -N
5	6	WRITE GATE-N
7	8	SEEK COMPLETE-N
9	10	TRACK ZERO-N
11	12	WRITE FAULT-N
13	14	HEAD SELECT 2 <sup>0</sup> -N
No Pin 15	16	N.C.
17	18	HEAD SELECT 2 <sup>1</sup> -N
19	20	INDEX-N
21	22	READY-N
23	24	STEP-N
25	26	DRIVE SELECT 0-N
27	28	DRIVE SELECT 1-N
29	30	N.C.
31	32	N.C.
33	34	DIRECTION IN-N

## Hard Disk Drive Data Signal Connectors

Connector J3: Drive 1

Connector J4: Drive 0

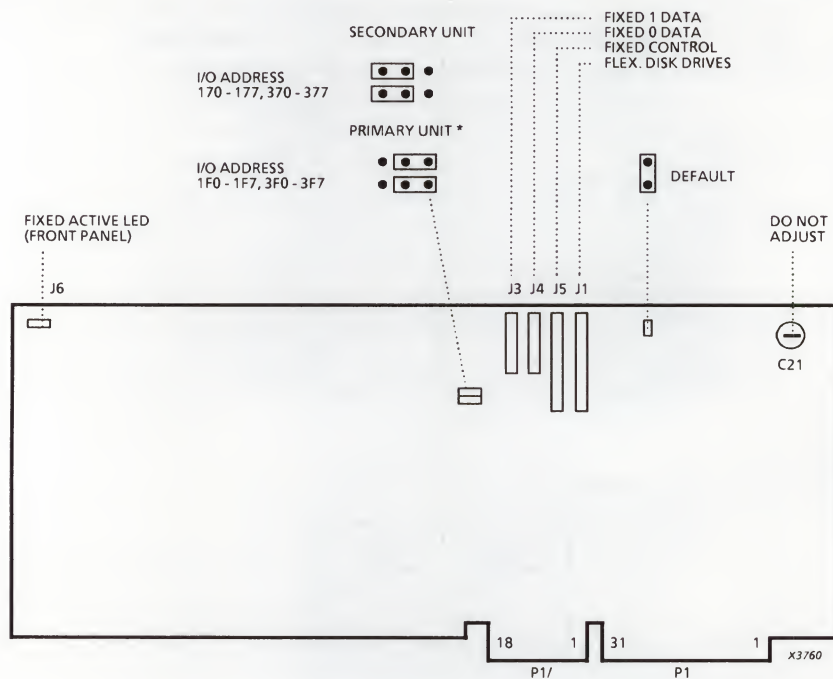
PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	N.C.	2	GROUND
3	N.C.	4	GROUND
5	N.C.	6	GROUND
7	READY LINE DRIVE	8	No Pin 8
9	N.C.	10	N.C.
11	GROUND	12	GROUND
13	+ MFM WRITE DATA	14	-MFM READ DATA
15	GROUND	16	GROUND
17	+ MFM READ DATA	18	-MFM READ DATA
19	GROUND	20	GROUND

## Hard Disk Activity LED Connector J6

PIN NUMBER	SIGNAL NAME
1	LED +
2	LED -
3	LED -
4	LED +



### 12.6.3. Strap Settings / Adjustments Western Digital 1002-WA2



### 12.6.5. Installation / Maintenance Western Digital 1002-WA2

The 1002-WA2 may be installed only in the AT option board slots. Check the strap settings before installing. Ensure that the drive cable connectors are plugged in correctly. (On the solder-side of the board, pin 1 of each connector has a square solder pad).

Take care that the correct drive types are set with the SETUP command.

## 12.7. WESTERN DIGITAL 1003-WA2

### 12.7.1. Characteristics Western Digital 1003-WA2

The Western Digital 1003-WA2, a cost reduced version of the 1002-WA2, is a general purpose Disk Controller Device that interfaces up to two Winchester Hard Disks and up to two Floppy disk Drives.

### 12.7.2. Connections Western Digital 1003-WA2

Flexible Drive Signal Connector J1

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	WRITE CURRENT CONTROL-N
3	4	N.C.
No Pin 5	6	N.C.
7	8	INDEX-N
9	10	MOTOR ON 1-N
11	12	DRIVE SELECT 2-N
13	14	DRIVE SELECT 1-N
15	16	MOTOR ON 2-N
17	18	DIRECTION-N
19	20	STEP-N
21	22	WRITE DATA-N
23	24	WRITE GATE-N
25	26	TRACK 0-N
27	28	WRITE PROTECT-N
29	30	READ DATA-N
31	32	SIDE SELECT-N
33	34	DISKETTE CHANGE-N

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	HEAD SELECT 2 <sup>3</sup> -N or REDUCED WRT CURRENT-N
3	4	HEAD SELECT 2 <sup>2</sup> -N
5	6	WRITE GATE-N
7	8	SEEK COMPLETE-N
9	10	TRACK ZERO-N
11	12	WRITE FAULT-N
13	14	HEAD SELECT 2 <sup>0</sup> -N
No Pin 15	16	N.C.
17	18	HEAD SELECT 2 <sup>1</sup> -N
19	20	INDEX-N
21	22	READY-N
23	24	STEP-N
25	26	DRIVE SELECT 0-N
27	28	DRIVE SELECT 1-N
29	30	N.C
31	32	N.C
33	34	DIRECTION IN-N

## Hard Disk Drive Data Signal Connectors

Connector J3: Drive 1

Connector J4: Drive 0

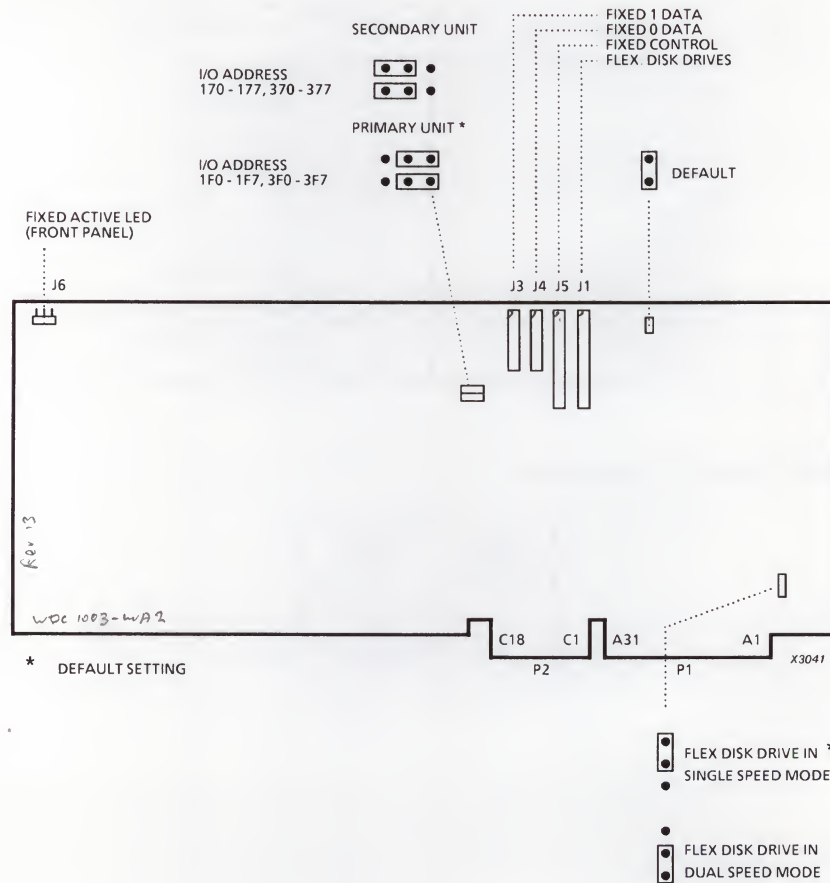
PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	N.C.	2	GROUND
3	N.C.	4	GROUND
5	N.C.	6	GROUND
7	READY LINE DRIVE	8	No Pin 8
9	N.C.	10	N.C.
11	GROUND	12	GROUND
13	+ MFM WRITE DATA	14	-MFM READ DATA
15	GROUND	16	GROUND
17	+ MFM READ DATA	18	-MFM READ DATA
19	GROUND	20	GROUND

## Hard Disk Activity LED Connector J6

PIN NUMBER	SIGNAL NAME
1	LED +
2	LED -
3	LED -
4	LED +



### 12.7.3. Strap Settings / Adjustments Western Digital 1003-WA2



### 12.7.5. Installation / Maintenance Western Digital 1003-WA2

The 1003-WA2 may be installed only in the AT option board slots. Check the strap settings before installing. Ensure that the drive cable connectors are plugged in correctly. (On the solder-side of the board pin 1 of each connector has a square solder pad).

Take care that the correct drive types are set with the SETUP command.



## 12.8. WESTERN DIGITAL 1003A-WA2

### 12.8.1. Characteristics Western Digital 1003A-WA2

The Western Digital 1003A-WA2 is a general purpose Disk Controller Device which interfaces up to Two Winchester Hard Disks and up to Two Floppy disk Drives.

### 12.8.2. Connections Western Digital 1003A-WA2

Flexible Drive Signal Connector J5

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	WRITE CURRENT CONTROL-N
3	4	N.C.
No Pin 5	6	N.C.
7	8	INDEX-N
9	10	MOTOR ON 1-N
11	12	DRIVE SELECT 2-N
13	14	DRIVE SELECT 1-N
15	16	MOTOR ON 2-N
17	18	DIRECTION-N
19	20	STEP-N
21	22	WRITE DATA-N
23	24	WRITE GATE-N
25	26	TRACK 0-N
27	28	WRITE PROTECT-N
29	30	READ DATA-N
31	32	SIDE SELECT-N
33	34	DISKETTE CHANGE-N



# Hard Disk Drive Control Interface Connector J4

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	HEAD SELECT 2 <sup>3</sup> -N or REDUCED WRT CURRENT-N
3	4	HEAD SELECT 2 <sup>2</sup> -N
5	6	WRITE GATE-N
7	8	SEEK COMPLETE-N
9	10	TRACK ZERO-N
11	12	WRITE FAULT-N
13	14	HEAD SELECT 2 <sup>0</sup> -N
No Pin 15	16	RECOVERY MODE
17	18	HEAD SELECT 2 <sup>1</sup> -N
19	20	INDEX-N
21	22	READY-N
23	24	STEP-N
25	26	DRIVE SELECT 0-N
27	28	DRIVE SELECT 1-N
29	30	N.C
31	32	N.C
33	34	DIRECTION IN-N

## Hard Disk Drive Data Signal Connectors

Connector J2: Drive 1

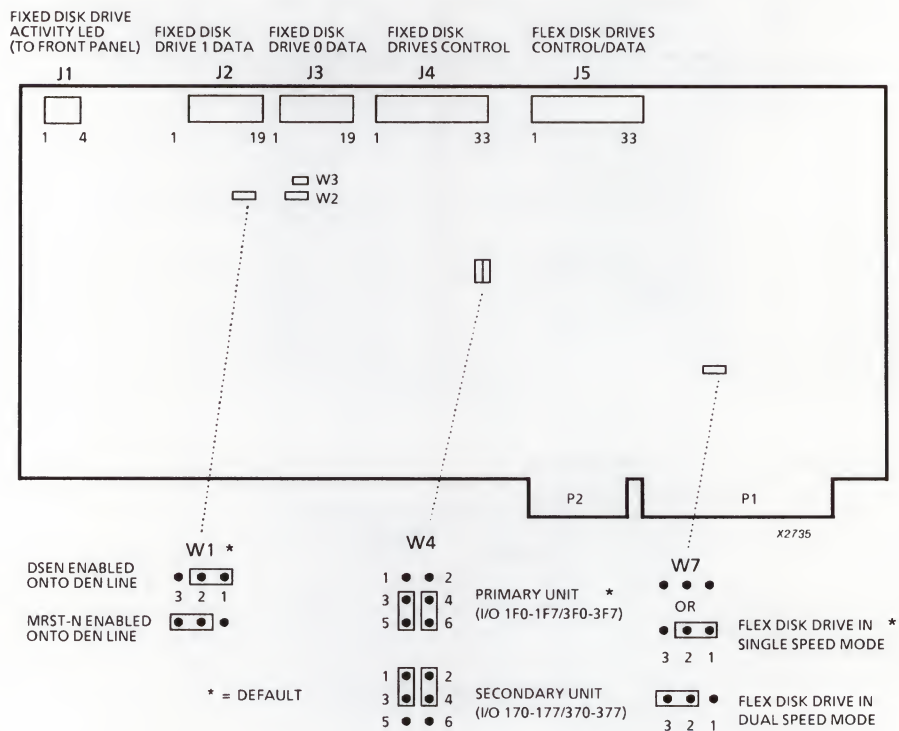
Connector J3: Drive 0

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	N.C.	2	GROUND
3	N.C.	4	GROUND
5	WRITE PROT. CARTRIDGE	6	GROUND
7	READY LINE DRIVE	8	No Pin 8
9	CARTRIDGE CHANGED	10	CARTRIDGE INSTALLED
11	GROUND	12	GROUND
13	+ MFM WRITE DATA	14	-MFM READ DATA
15	GROUND	16	GROUND
17	+ MFM READ DATA	18	-MFM READ DATA
19	GROUND	20	GROUND

## Hard Disk Activity LED Connector J1

PIN NUMBER	SIGNAL NAME
1	LED +
2	LED -
3	LED -
4	LED +

### 12.8.3. Strap Settings / Adjustments Western Digital 1003A-WA2



### **12.8.5. Installation / Maintenance Western Digital 1003A-WA2**

The 1003A-WA2 may be installed only in the AT option board slots. Check the strap settings before installing. Ensure that the drive cable connectors are plugged in correctly (check the reverse of the board, pin 1 of each connector has a square solder pad).

Take care that the correct drive types are set with the SETUP command.





## 12.9. WESTERN DIGITAL WD1003V-SM2

### 12.9.1. Characteristics Western Digital WD1003V-SM2

The Western Digital WD1003V-SM2 is a general purpose disk controller which interfaces up to two hard disk drives and up to two floppy disk drives.

### 12.9.2. Connections Western Digital WD1003V-SM2

Hard Disk Drive LED Indicator Connector J6

PIN No.	SIGNAL NAME
1	LED +
2	ACTIVE-N
3	ACTIVE-N
4	LED +

Hard Disk Drive Control Connector J5

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	HS3-N
3	4	HS2-N
5	6	WRG-N
7	8	SC-N
9	10	TK0-N
11	12	WF-N
13	14	HS0-N
15	16	N.C.
17	18	HS1-N
19	20	INDEX-N
21	22	DRDY-N
23	24	STEP-N
25	26	DS0-N
27	28	DS1-N
29	30	N.C.
31	32	N.C.
33	34	DIRC-N

## Hard Disk Drive Data Connectors J3 and J4

Connector J3 is for drive 1

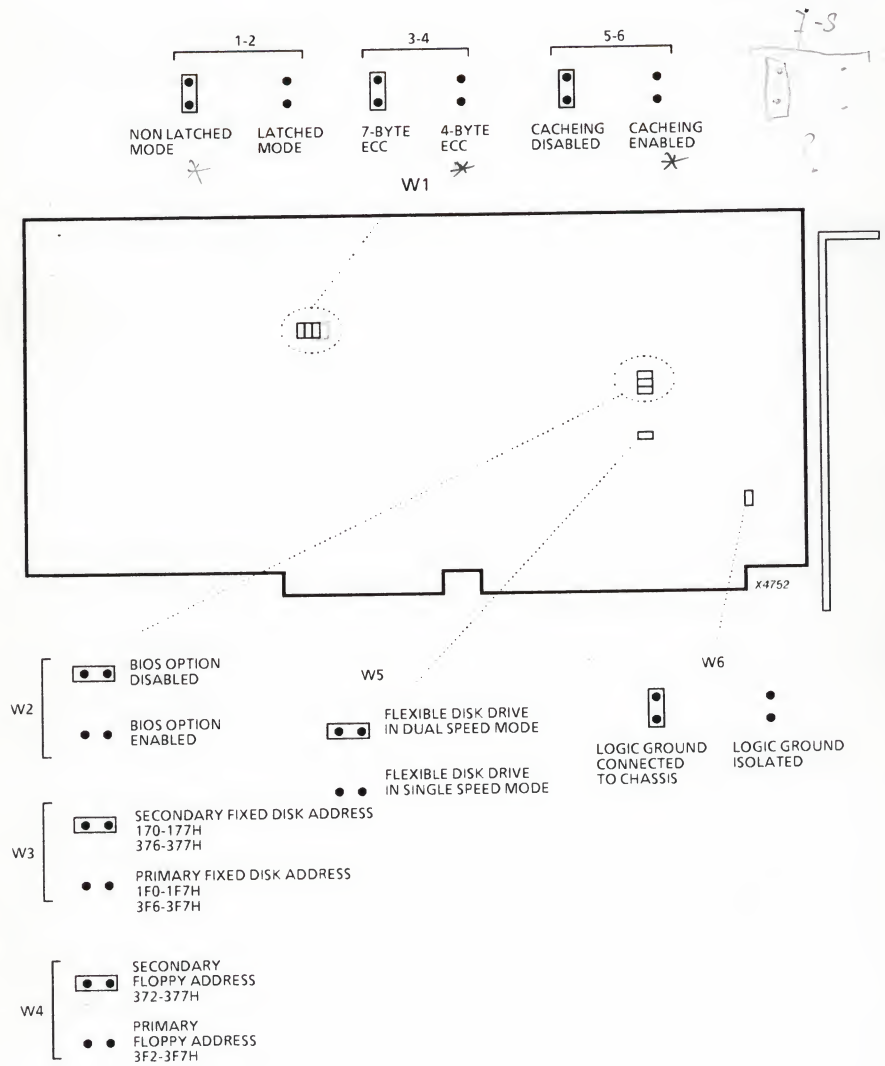
Connector J4 is for drive 0

PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
1	N.C.	2	GND
3	N.C.	4	GND
5	N.C.	6	GND
7	N.C.	8	KEY
9	N.C.	10	N.C.
11	GND	12	GND
13	+ WMFM	14	- WMFM
15	GND	16	GND
17	+ RMFM	18	- RMFM
19	GND	20	GND

## Floppy Disk Drive Connector J1

PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
1	GND	2	FRWC-N
3	GND	4	N.C.
5	GND	6	N.C.
7	GND	8	IDX-N
9	GND	10	MO1-N
11	GND	12	FDS2-N
13	GND	14	FDS1-N
15	GND	16	MO2-N
17	GND	18	FDIRC-N
19	GND	20	FSTEP-N
21	GND	22	FWD-N
23	GND	24	FWE-N
25	GND	26	FTK0-N
27	GND	28	FWP-N
29	GND	30	FRDD-N
31	GND	32	FHS-N
33	GND	34	DCHG-N

### 12.9.3. Strap Settings / Adjustments Western Digital WD1003V-SM2





#### 12.9.5. Installation / Maintenance Western Digital WD1003V-SM2

The WD1003V-SM2 may be installed only in the AT option board slots. Check the strap settings before installation. Ensure that the drive cable connectors are plugged in correctly (check the reverse of the board, pin 1 of each connector has a square solder pad). Take care that the correct drive types are defined with the MS-DOS SETUP command.

## 12.10. XT STORAGE ADAPTER

### 12.10.1. Characteristics XT Storage Adapter

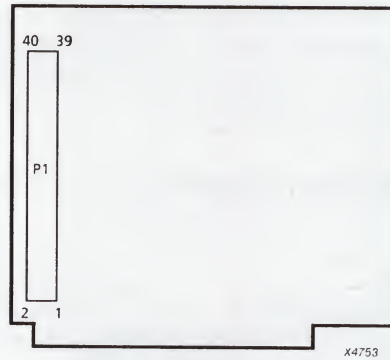
The XT Storage Adapter is used in, e.g. the P3105 where a CD-ROM drive and XT hard disk with an embedded controller are used. The XT hard disk drive in the P3105 should be connected to the storage adapter (and not the interface on the main board) to avoid conflicts with the DMA channels being used.

### 12.10.2 Connections XT Storage Adapter

Drive Connector P1

PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
1	RESET	21	AEN
2	GND	22	GND
3	D7	23	IOW-N
4	GND	24	GND
5	D6	25	IOR-N
6	GND	26	GND
7	D5	27	DACK3-N
8	GND	28	GND
9	D4	29	DRQ3
10	GND	30	GND
11	D3	31	IRQ5
12	GND	32	GND
13	D2	33	A1
14	GND	34	GND
15	D1	35	A0
16	GND	36	GND
17	D0	37	HDCS-N
18	GND	38	GND
19	GND	39	N.C.
20	KEY	40	GND

### 12.10.2. Strap Settings / Adjustments XT Storage Adapter



**Note:** There are no straps present on the XT storage adapter (the pin numbering and location of P1 are given above).

### 12.10.5. Installation / Maintenance XT Storage Adapter

The XT storage adapter may be installed only in the XT option board slots. Ensure that the drive cable connector is plugged in correctly (pin 20 on P1 is the polarizing pin). When this board is used in a P3105, switch SW1-8 on the motherboard must be set to the on position so that the hard disk interface on the motherboard is disabled.

## 12.11. AT STORAGE ADAPTER

### 12.11.1. Characteristics AT Storage Adapter

The AT Storage Adapter can be used in conjunction with up to two floppy disk drives and one AT hard disk drive with embedded controller.

### 12.11.2 Connections AT Storage Adapter

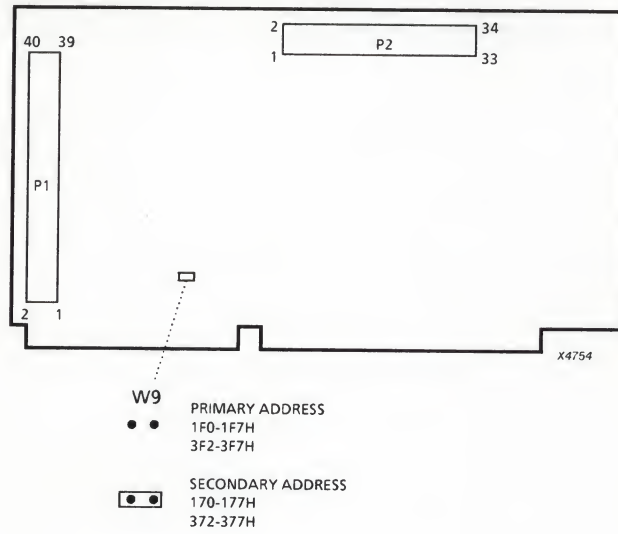
Hard Disk Drive Connector P1

PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
1	RST-N	21	N.C.
2	GND	22	GND
3	SD7	23	SIOW-N
4	SD8	24	GND
5	SD6	25	SIOR-N
6	SD9	26	GND
7	SD5	27	IOCHREADY
8	SD10	28	BALE
9	SD4	29	N.C.
10	SD11	30	GND
11	SD3	31	IRQ
12	SD12	32	IOCS16-N
13	SD2	33	SA1
14	SD13	34	N.C.
15	SD1	35	SA0
16	SD14	36	SA2
17	SD0	37	SCS0-N
18	SD15	38	SCS1-N
19	GND	39	ACTIVE-N-N
20	KEY	40	GND



PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
1	GND	2	HDI-N
3	KEY	4	HDL-N
5	GND	6	N.C.
7	GND	8	INDEX-N
9	GND	10	MOTA-N
11	GND	12	SELB-N
13	GND	14	SELA-N
15	GND	16	MOTB-N
17	GND	18	DIR-N
19	GND	20	STEP-N
21	GND	22	WRDATA-N
23	GND	24	WRGATE-N
25	GND	26	TRK0-N
27	GND	28	WRPROT-N
29	GND	30	RDDATA-N
31	GND	32	SIDE-N
33	GND	34	DCH-N

### 12.11.3. Strap Settings / Adjustments AT Storage Adapter



#### 12.11.5. Installation / Maintenance AT Storage Adapter

The AT storage adapter may be installed only in the AT option board slots. Check the strap settings before installation. Ensure that the drive cable connectors are plugged in correctly (pin 20 on P1 is the polarizing pin, and pin 3 on P2 is similarly the polarizing pin). Take care that the correct drive types are defined with the MS-DOS SETUP command.

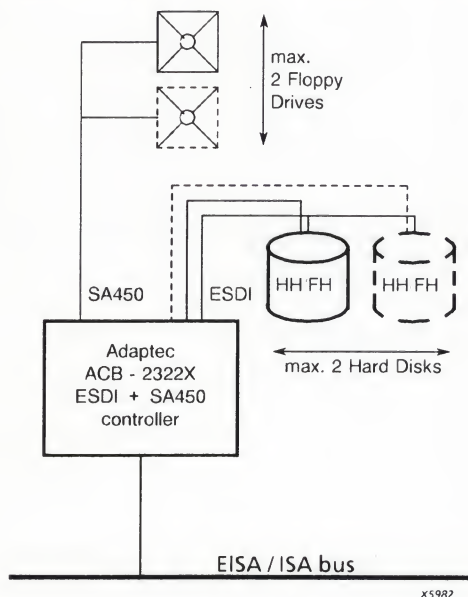
## 12.12. ADAPTEC ACB-2322X

### 12.12.1. Characteristics Adaptec ACB-2322X

The Adaptec ACB-2322X is an Enhanced Small Device Interface (ESDI) hard disk controller which controls up to two ESDI compatible hard disk drives. It also controls up to two flexible disk drives. It provides 8 Kbyte of RAM for full-track buffering by the ACB-2322 (old version) and 64Kbyte of for full-track buffering by the ACB-2322D. The Adaptec ACB-2322X is software and hardware compatible with the PC-AT hard disk controller interface.

**NOTE:** There are two board-types: - Adaptec ACB-2322 (old version)  
Adaptec ACB-2322D (new version)

Both board-types are functionally the same. The differences are the board-size, the strap settings, the connector positions and buffer size.





### 12.12.2. Connections Adaptec ACB-2322X

Flexible Drive Interface

(connector J1 of ACB-2322 or connector J5 of ACB-2322D)

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	WRITE CURRENT CONTROL-N
3	4	N.C.
No Pin 5	6	N.C.
7	8	INDEX-N
9	10	MOTOR ON 1-N
11	12	DRIVE SELECT 2-N
13	14	DRIVE SELECT 1-N
15	16	MOTOR ON 2-N
17	18	DIRECTION-N
19	20	STEP-N
21	22	WRITE DATA-N
23	24	WRITE GATE-N
25	26	TRACK 0-N
27	28	WRITE PROTECT-N
29	30	READ DATA-N
31	32	SIDE SELECT-N
33	34	DISKETTE CHANGE-N

Hard Disk ESDI Control Interface (for both Drives)  
(connector J5 of ACB-2322 or connector J4 of ACB-2322D)

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	HEAD SELECT 2 <sup>3</sup> -N
3	4	HEAD SELECT 2 <sup>2</sup> -N
5	6	WRITE GATE-N
7	8	CONFIGURATION STATUS-N
9	10	TRANSFER ACK-N
11	12	ATTENTION-N
13	14	HEAD SELECT 2 <sup>0</sup> -N
No Pin 15	16	SECTOR-N
17	18	HEAD SELECT 2 <sup>1</sup> -N
19	20	INDEX-N
21	22	READY-N
23	24	TRANSFER REQ-N
25	26	DRIVE SELECT 0-N
27	28	DRIVE SELECT 1-N
29	30	N.C
31	32	READ GATE-N
33	34	COMMAND-N

Hard Disk ESDI Data Interface (Drive 0)  
(connector J4 of ACB-2322 or connector J3 of ACB-2322D)

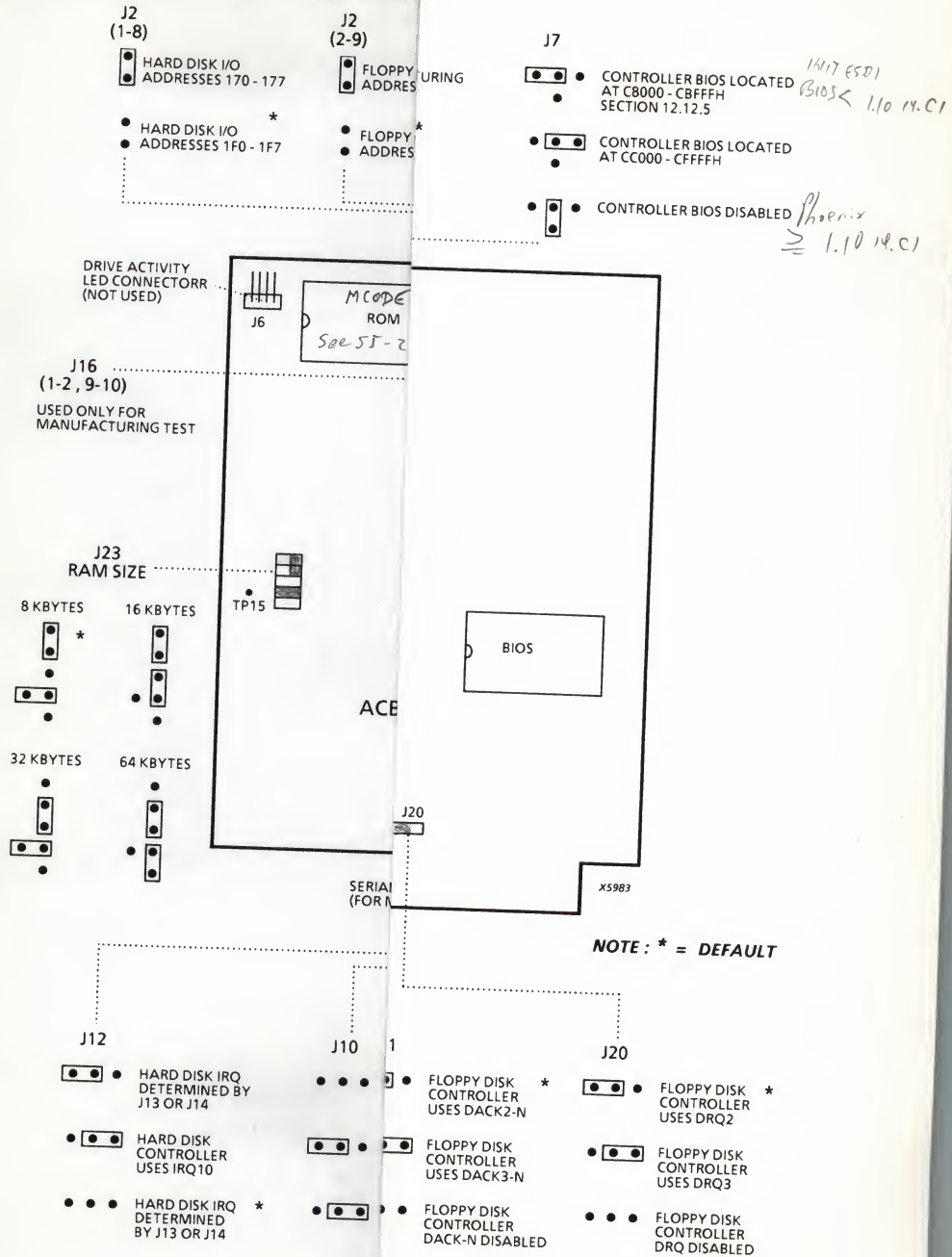
Hard Disk ESDI Data Interface (Drive 1)  
(connector J3 of ACB-2322 or connector J2 of ACB-2322D)

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	DRIVE SELECTED-N	2	N.C.
3	COMMAND COMPLETE-N	4	ADDRESS MARK ENABLE-N
5	GROUND	6	GROUND
7	+ WRITE CLOCK	8	- WRITE CLOCK
9	GROUND	10	+ READ CLOCK
11	- READ CLOCK	12	GROUND
13	+ NRZ WRITE DATA	14	-NRZ WRITE DATA
15	GROUND	16	GROUND
17	+ NRZ READ DATA	18	-NRZ READ DATA
19	GROUND	20	N.C.

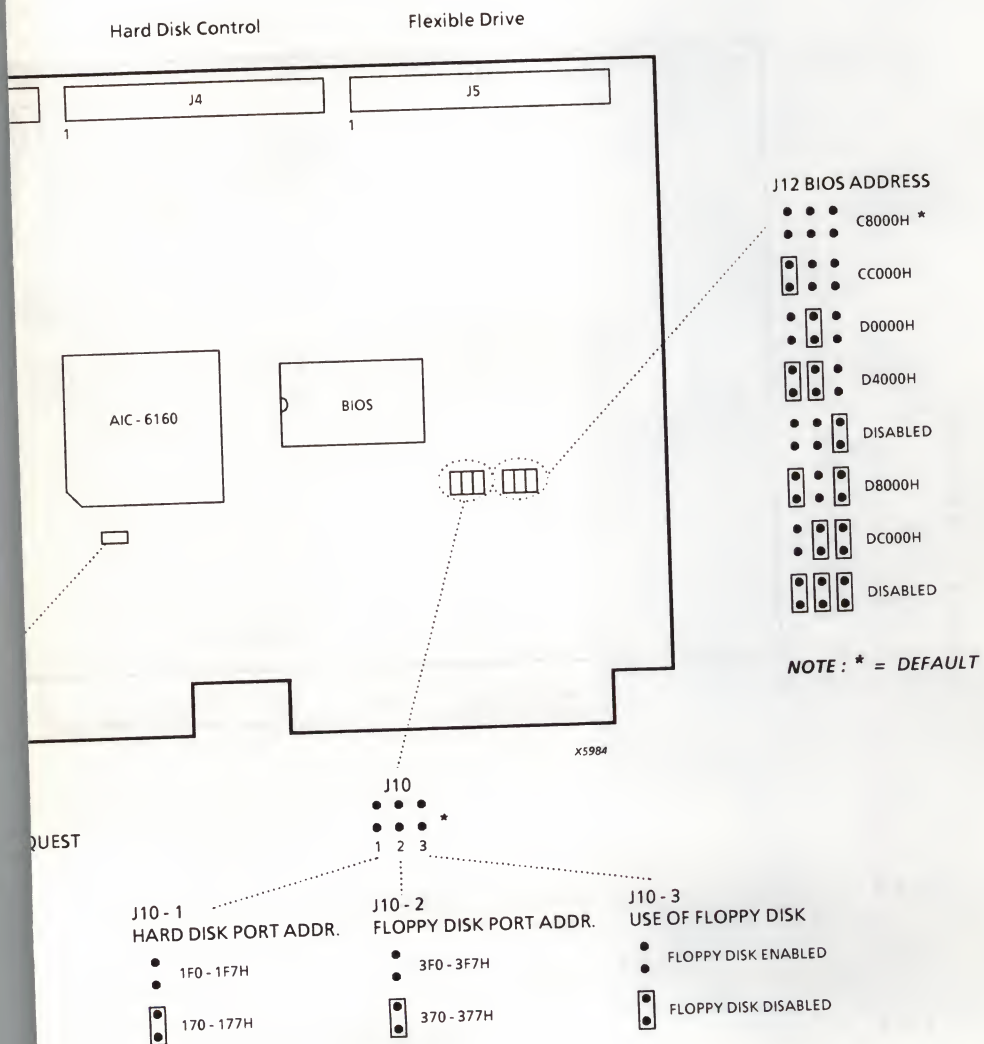
Hard Disk Activity LED Interface  
(connector J6 of ACB-2322 or connector J1 of ACB-2322D)

PIN NUMBER	SIGNAL NAME
1	LED +
2	LED -
3	LED -
4	LED +

### 12.12.3. Strap Settings / Adjustments







NS CE

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9009

#### 12.12.4. Modification History Adaptec ACB-2322

12NC	SUBJECT
04580	Initial release.
04580	Reconnect pin 8 or replace connector J4 completely
04580	Disconnect software reset from MOTOR-ON signal (strap from pin 4 of U7 to pin 5)

The numbers are the last 5 digits of the 12NC number (5107 029 xxxxx).

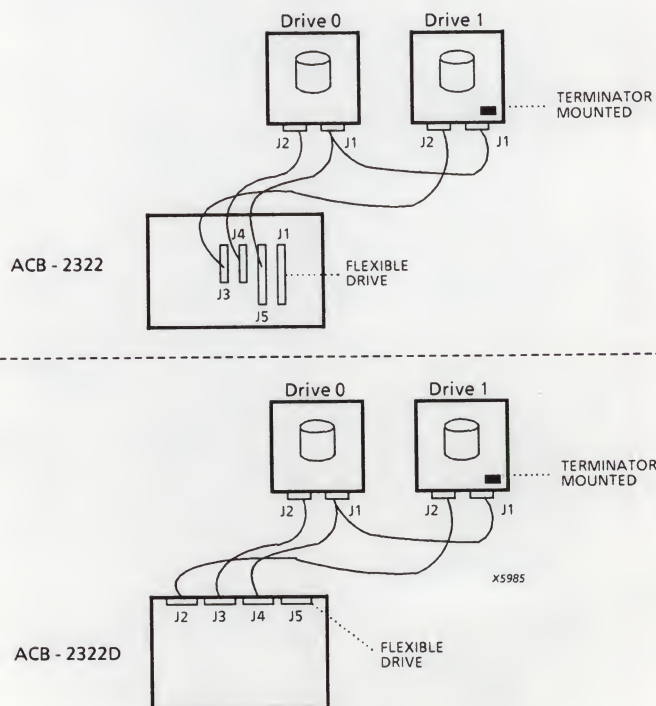
### 12.12.5. Installation / Maintenance Adaptec ACB-2322X

The Adaptec ACB-2322X must be installed in the AT option board slots. Check the strap settings before installing.

Ensure that the drive cable connectors are plugged in correctly (pin 1 of each connector has a square solder pad on the electronic board of the drive).

Ensure that a terminator is mounted on the last drive of the ESDI chain (control).

**NOTE:** In systems using a Phoenix BIOS version 1.10.14.C1 or later, the controller BIOS strap (J7) must be set to disabled (see previous pages). This allows the special P1 drive tables present in the system BIOS to be used with Novell Advanced Netware. For systems with BIOS versions before Phoenix BIOS version 1.10.14.C1, the default position for J7 is to enable the controller BIOS on address C8000H. Whenever the INITESDI utility is used to perform a low level format, J7 must be set to enable the controller BIOS on address C8000H irrespective of the BIOS revision (the controller BIOS should then be disabled again, if required). Take care that the correct drive types are set with the SETUP command.



## 12. DISK CONTROL UNITS

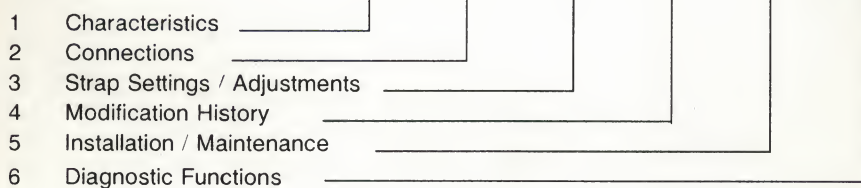
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1.1: Option Cross Reference Guide	12.1-1
1.2: Technical Data	12.1-2

2: DCM Controller	12.2-1	12.2-2	12.2-3	12.2-4	n.a.	n.a.
3: Western Digital 1002S-WX2 / WX2A	12.3-1	12.3-1	12.3-3	12.3-5	12.2-5	n.a.
4: Western Digital 1002A-WX1	12.4-1	12.4-1	12.4-3	12.4-4	12.4-4	n.a.
5: CD-ROM Controller CM153	12.5-1	12.5-1	12.5-2	n.a.	12.5-3	n.a.
6: Western Digital 1002-WA2	12.6-1	12.6-1	12.6-4	n.a.	12.6-5	n.a.
7: Western Digital 1003-WA2	12.7-1	12.7-1	12.7-4	n.a.	12.7-5	n.a.
8: Western Digital 1003A-WA2	12.8-1	12.8-1	12.8-4	n.a.	12.8-5	n.a.
9: Western Digital 1003V-SM2	12.9-1	12.9-1	12.9-3	n.a.	12.9-4	n.a.
10: XT Storage Adapter	12.10-1	12.10-1	12.10-2	n.a.	12.10-2	n.a.
11: AT Storage Adapter	12.11-1	12.11-1	12.11-3	n.a.	12.11-4	n.a.
12: Adaptec ACB-2322X	12.12-1	12.12-2	12.12-5	12.12-7	12.12-7	n.a.

Subsection:



**NOTE:** n.a. means that this section is not available for this unit.



13: Western Digital 1003V-MM2	12.13-1	12.13-1	12.13-3	n.a.	12.13-4	n.a.
14: Adaptec AHA-1542X	12.14-1	12.14-2	12.14-5	n.a.	12.14-8	n.a.
15: Mitac Hard Disk Adapter	12.15-1	12.15-1	12.15-2	n.a.	12.15-2	n.a.
16: External Boot Option	12.16-1	12.16-1	12.16-3	n.a.	12.16-4	n.a.
17: Ultra 12(F) ESDI Controller	12.17-1	12.17-2	12.17-5	n.a.	12.17-6	n.a.
18: MYLEX SCSI Controller	12.18-1	12.18-2	12.18-5	n.a.	12.18-6	n.a.
19: Adaptec AHA-1740	12.19-1	12.19-2	12.19-3	12.19-4	12.19-4	2.19-5

## Subsection:

1	Characteristics	_____	↑
2	Connections	_____	↑
3	Strap Settings / Adjustments	_____	↑
4	Modification History	_____	↑
5	Installation / Maintenance	_____	↑
6	Diagnostic Functions	_____	↑

**NOTE:** *n.a. means that this section is not available for this unit.*



## FIELD CHANGE

Title: 1. Adaptec ACB-2322 can fail with fixed disks      SInr: P3000-209  
pin 8 of connector J4 has been cut off.      P9100-001

2. Solution: replace pin 8 or connector J4 completely.

System series: P3000  
Model : P3360/P9135/P9165

Main:	Code:	New:	Service:	Serialnr:
Assy	nr.	rev.	12NC	affected
A. ESDI controller	ACB-2322	5322	216	23161 see appendix

Modification class: Mandatory

Date: 21-05-1990

Revised:

est.time: 15 min.

## Note:

1. CONDITION : Unpredictable failures originating from the ESDI harddisk controller like: drive format error, write and verify errors. The problems are caused by a missing balanced write signal on the ESDI interface (WRCLK-). The signal pin (pin 8 of connector J4) has been cut off in production of the systems.
2. CORRECTION : Reconnect pin 8 of J4. **DR1**
3. REMOVE : Remove the remains of the cut off pin 8 of J4 or the complete connector J4. Remove the polarizing notch from the interface cable.
4. ADD : Replace header pin or complete connector J4.
5. ADJUSTMENTS : - Backup user's data  
- Modify ESDI controller and interface cable  
- Reformat (low level) harddisk using INITESDI.COM  
- Restore user's data
6. PARTS : 1 header pin or 20 position header
7. STATUS CHANGE : There will be no status change.
8. TEST FACILITIES  
AFFECTED : None
9. DOCUMENTS  
AFFECTED : None
10. REMARKS : If rework is done carefully the warranty will not be voided.

Responsibility: G.J. Bruntink

Revised:

SInr: P3000-209  
P9100-001

# Appendix

All systems built after March-19-1990 do not need this retrofit.

CONFIGURATION	SERIAL #		QTY
	From:	To:	
P3360-164	B6002168 -	B6002267	100
P3360-344	B6002084 -	B6002164	81
P3360-164	B6001897 -	B6002046	150
P3360-164	B6001706 -	B6001825	120
P3360-344	B6001548 -	B6001647	100
P3360-164	B6001438 -	B6001467	30
P3360-344	B6001346 -	B6001395	50
P3360-164	B6001246 -	B6001345	100
P3360-344	B6001146 -	B6001245	100
P3360-344	B6000566 -	B6000675	110
P3360-344	B6000541 -	B6000565	25
P3360-164	B6000471 -	B6000540	70
P3360-164	B6000101 -	B6000120	20
P3360-344	B6000051 -	B6000075	25
P3360-164	B6000076 -	B6000100	25
P9135-164	B6001826 -	B6001896	71
P9135-164	B6001498 -	B6001547	50
P9135-164	B6001468 -	B6001497	30
P9135-164	B6001096 -	B6001145	50
P9135-164	B6000221 -	B6000270	50



Internal Memo  
For internal use only

PHILIPS  
Information Systems  
CDB90/135/  
department  
OFS

from A. Vermeulen ext. 055-432789

to  
Messrs.  
Dr. R.-I. Schwertner  
E. Klein  
K.-D. Diehl  
V. Wijermars  
P. Vis  
A. Vlaander  
G.J. Bruntink  
L. Alliki

department  
Eiserfeld  
Eiserfeld  
Eiserfeld  
HD  
HD  
Sys Sup  
CS  
EMO

subject  
Problems with ESDI drives in Megadoc

date  
900507

IMPORTANT WARNING - ERROR

We had the problem that a 170MB ESDI FXD drive got completely haywire, even no formatting possible anymore. I just hear from Service that this caused by a mistake made in Montreal.

On the Adaptec ESDI controller, the small cable to the drive, sometimes pin 8 of the connector has been cut off and a notch is put in the cable connector.

THIS IS WRONG!

The connector on the card must be repaired / replaced and the notch removed from the cable connector.

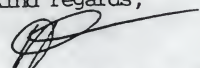
The problem occurred in a Megadoc Database Server P3360, but can happen in all P33xx/P91x5 systems that use the Adaptec ESDI controller. It shows only when the disk gets full.

I ask both Eiserfeld and Internal Service to check all P33xx/P91x5 systems with Adaptec controllers and ESDI drives and repair if necessary.

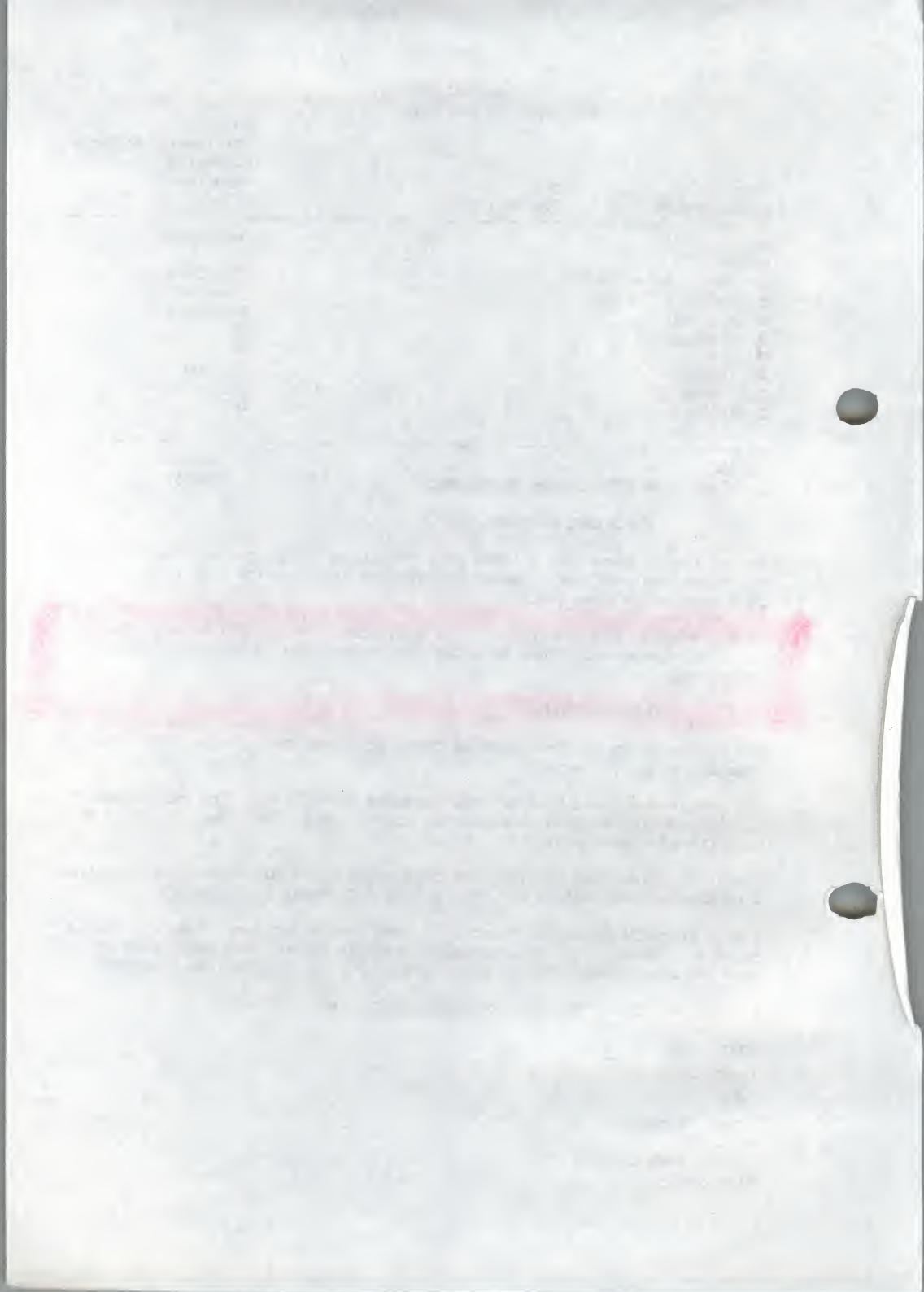
I hear that this problem is known by some people for some time, and that a Service Information is being made. I strongly demand that these kind of problems are communicated to the users of PCs as soon as they are known.

An official Change Request from Basic System will follow.

Kind regards,

  
Arjaen Vermeulen,  
dept. OFS.  
Philips Data Systems  
Apeldoorn.





Actions to perform the patch (text between "" must be typed in):

- 1) Backup the system (e.g. by means of qsv)  
This is necessary because all data on the disk will be lost.
- 2) Boot from a MSDOS 4.01 bootfloppy.
- 3) perform 1st debug session as described: *or INTESDI*  
"debug<ret>" :start debug  
- "g=c800:5<ret>" :start program on controller  
<menu> choice "3<ret>" :special options menu  
<menu> choice "3<ret>" :turn off all translations  
<menu> choice "1<ret>" :select drive number 1  
<menu> choice "y<ret>" :confirm  
<menu> choice "q<ret>" :quit options menu  
<menu> choice "q<ret>" :quit controller program
- 4) perform 2nd debug session as described:  
"debug<ret>" :start debug  
- "e0:180 ff" :patch address 0:180  
- "e0:181 03" :patch address 0:181  
- "q" :quit debug

Since this debug session is advised to be performed on every machine startup the debug commands must be put in a command file called "patch". This can be done with any ascii editor (e.g. edlin). The text is as follows:

```
e0:180 ff
e0:181 03
q
```

- 5) create a MSDOS partition on the disk:  
"fdisk<ret>" :start fdisk  
<menu> choice "1" or "<ret>" :create partition  
<menu> choice "1" or "<ret>" :primary MSDOS partition  
<menu> choice "y" or "<ret>" :full size partition  
<hit any key to reboot>
- 6) after reboot from floppy the harddisk must be formatted:  
"format c: /S<ret>"
- 7) transfer debug and patch to the harddisk:  
"copy a:debug.\* c:\<ret>"  
"copy a:patch c:\<ret>"
- 8) restore the backup
- 9) put the commandline "debug <patch>" in the autoexec.bat file

Rob Willemsen  
dpt. OFS  
PHILIPS Apeldoorn Holland

The ADAPTEC ESDI controllers revision A, B and C have a problem running DOS if a disk with more than 1024 cylinders is connected. ADAPTEC has solved this problem in revision D or higher.

There is a TEMPORARY patch possible to be able to run DOS with the combination mentioned before. This patch is a combination of turning off the "63 sector translation" on the disk controller and telling DOS it can use the maximum of 1024 cylinders on the disk.

The patch will REDUCE the maximum available diskspace !!

The tools that are needed :  
- debug (MSDOS debugger)  
- fdisk (disk partitioner)  
- edlin (or any other ascii editor)

The actions to perform the patch are described on the next page.

If the patched ADAPTEC controller is replaced by a revision D or higher the normal installation instructions for a MSDOS harddisk must be performed completely (make a backup before installing a new controller).  
It must be stressed that this patch is not seen as a solution to the problem. The only solution is the new revision controller. The patch will avoid corrupted harddisks.

Rob Willemsen  
dpt. OFS  
PHILIPS Apeldoorn Holland  
tel. 055-432777





## service information



## FIELD CHANGE

Title: 1. Corruption of FAT table in P3360/P3370  
2. New microcode in Adaptec ACB2322B ESDI cntr

Slnr: P3000-255

System series: P3000  
Model : P3360, P3370

Main:	Code:	New:	Service:	Serialnr:
Assy	nr.	rev.	12NC	affected
A. ACB 2322B	5107 029 04580 --	5322 216 23161		all

Modification class: Mandatory (see 10: "Remarks")

Date: 28-01-1991

Note: MSA-034-733 Previous SI P3000-216

Revised:

Est.inst.time: 10 minutes  
(for HW change only)

1. CONDITION : The ACB2322B can cause a corrupted FAT table on the hard disk, especially when SMARTDRV.SYS is used.
2. CORRECTION : Change microcode of the board.
3. REMOVE : EPROM with microcode at position U2
4. ADD : EPROM: 8122 189 15021 at position U2
5. ADJUSTMENTS : Check the status of the file system with the DOS command CHKDSK or for example with Norton Disk Doctor.  
  
Remark: Microsoft prescribes for Windows 3.0 that for Adaptec controllers the double buffering for SMARTDRV.SYS should be disabled. You can do this by adding the /B-switch at the end of the SMARTDRV device line in the CONFIG.SYS file.  
For example:  
  
DEVICE=C:\WINDOWS\SMARTDRV.SYS 1024 512 /B-  
  
6. PARTS : New Microcode in EPROM 27128 - 200ns.  
Partnumber: 8122 189 15021  
Serv. 12NC of the empty EPROM is: 5322 209 51512
7. STATUS CHANGE : No status change of the board
8. TEST FACILITIES  
AFFECTED : None
9. DOCUMENTS  
AFFECTED : None

  
Responsibility: J. Groothedde





Revised:

SInr: P3000-255

10. REMARKS

: Due to the risk of loosing data, this fieldchange is mandatory. However only a very limited number of problem reports have been received from the field. So it doesn't seem to be necessary to update all boards at very high priority, but e.g. at the next regular visit.

The BIOS can be downloaded via the Service Information Retrieval system. It is in the PC-Firmware cabinet.

or,

the EPROM(s) can be ordered via:

PTDSN B.V. Apeldoorn  
Dept: Customer Support Logistics  
Att.: Mr. H. Vlottes, Order Desk  
P.O. Box 245  
7300 AE Apeldoorn  
Tel. : +31 55 432003  
Telex : 36345, Route indicator NLATFIR  
Fax : +31 55 432267



service information



# TECHNICAL TIP

Title: Introduction of the Adaptec ACB-2322D ESDI controller SInr: P3000-246

System series: P3000  
Model : P3360, P3370

Main:	Code:	New:	Service:	Serialnr:
Assy	nr.	rev.	12NC	affected
A.	5107 029 05260		5322 216 23478	
B.				

Date: 23 November 1990  
Revised:  
est.time:

## Note:

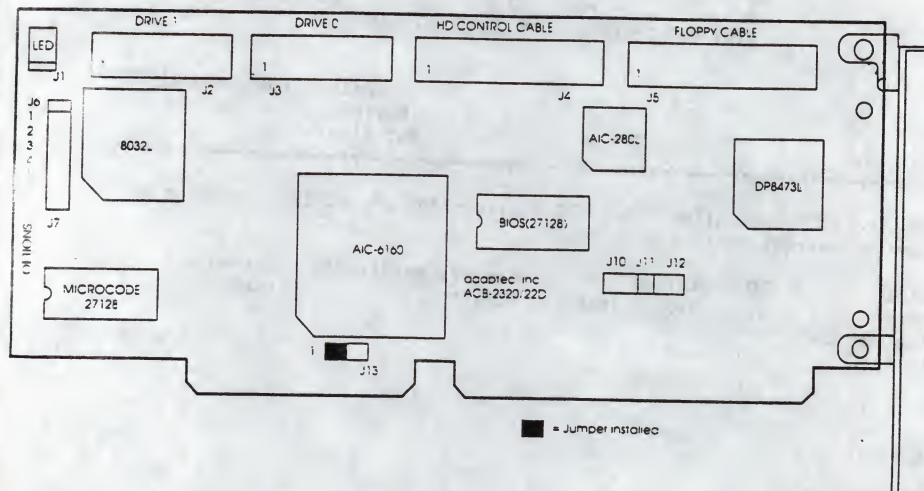
A new Adaptec ESDI controller ACB-2322D replaces the ACB-2322B. The board has the following characteristics:

Data rate:	20 Mbits/sec	Sectors per track:	variable
Dimensions:	8.0x3.9x0.75 inch	Buffer:	64kB
Data transfer by Coretest:	≥ 1800 kB		

Strapsetting:

see next page

Responsibility: Jan Groothedde



SOFTWARE OPTION JUMPERS	
J7-1	NOT USED
J7-2	LOGICAL DRIVE SPLITTING *Out = drive uses physical parameters In = Drive 0 is split into two logical drives. (if over 1024 cylinders)
	RESERVED
J7-4	NOT USED
J7-5	READ AHEAD CACHE *Out = Enabled In = No Read Ahead performed.
J7-6	RESERVED
J7-7	RESERVED

CONNECTORS
J5 - FLOPPY DRIVE
J3 - HARD DRIVE 0. DATA CABLE
J2 - HARD DRIVE 1. DATA CABLE
J4 - HARD DRIVE CONTROL CABLE
J1 - DRIVE ACTIVITY LIGHT

\* = as shipped  
Out = No jumper installed  
In = Jumper installed

JUMPERS			
J10-1	HARD DISK PORT ADDRESS *Out = 1F0-1F7 In = 170-177		
J10-2	FLOPPY DISK PORT ADDRESS *Out = 3F0-3F7 In = 370-377		
J10-3	FLOPPY DISK DISABLE *Out = Floppy enabled In = Floppy disabled		
J11-1	FLOPPY DRIVE SPEED *Out = Single speed In = Dual speed		
J12	BIOS ADDRESS	1	2 3
	*C8000	out	out out
	CC000	in	out out
	D0000	out	in out
	D4000	in	in out
	Disabled	out	out in
	D8000	in	out in
	DC000	out	in in
J13	*1-2 IRQ 14 2-3 IRQ 15		



## 12.13. WESTERN DIGITAL WD1003V-MM2

### 12.13.1. Characteristics Western Digital WD1003V-MM2

The Western Digital WD1003V-MM2 is a general purpose disk controller which interfaces up to two hard disk drives and up to two floppy disk drives.

### 12.13.2. Connections Western Digital WD1003V-MM2

Hard Disk Drive LED Indicator Connector J6

PIN No.	SIGNAL NAME
1	LED +
2	ACTIVE-N
3	ACTIVE-N
4	LED +

Hard Disk Drive Control Connector J5

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	HS3-N
3	4	HS2-N
5	6	WRG-N
7	8	SC-N
9	10	TK0-N
11	12	WF-N
13	14	HS0-N
15 (KEY)	16	N.C.
17	18	HS1-N
19	20	INDEX-N
21	22	DRDY-N
23	24	STEP-N
25	26	DS0-N
27	28	DS1-N
29	30	N.C.
31	32	N.C.
33	34	DIRC-N



## Hard Disk Drive Data Connectors J3 and J4

Connector J3 is for drive 1

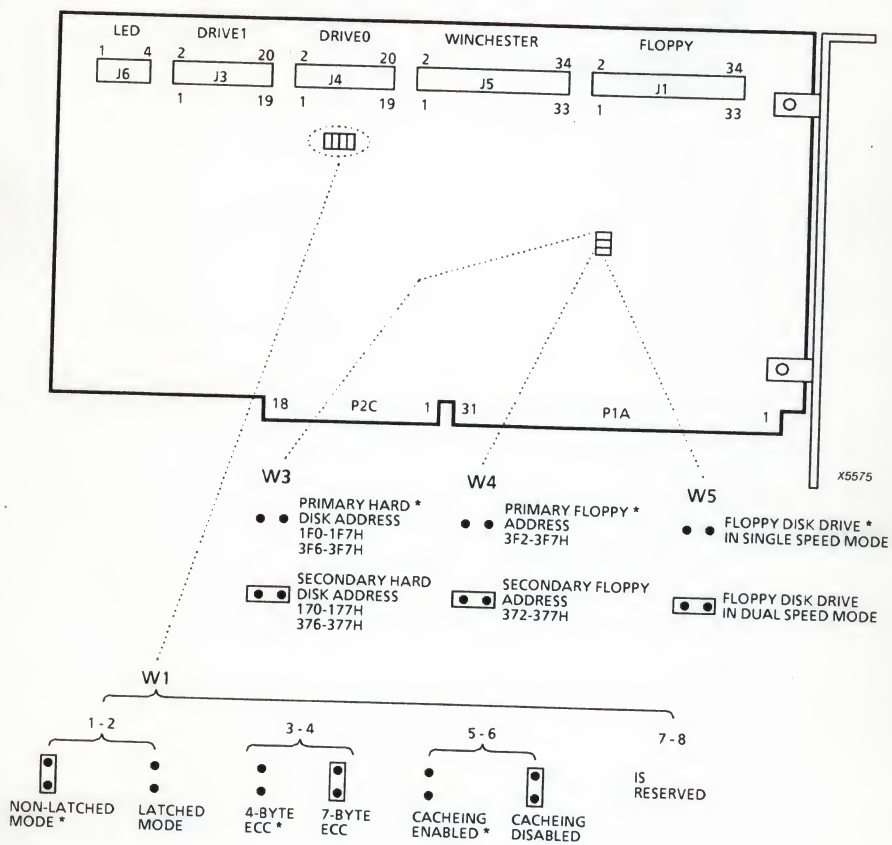
Connector J4 is for drive 0

PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
1	N.C.	2	GND
3	N.C.	4	GND
5	N.C.	6	GND
7	N.C.	8	KEY
9	N.C.	10	N.C.
11	GND	12	GND
13	+ WMFM	14	- WMFM
15	GND	16	GND
17	+ RMFM	18	- RMFM
19	GND	20	GND

## Floppy Disk Drive Connector J1

PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
1	GND	2	FRWC-N
3	GND	4	N.C.
5	KEY	6	N.C.
7	GND	8	IDX-N
9	GND	10	MO1-N
11	GND	12	FDS2-N
13	GND	14	FDS1-N
15	GND	16	MO2-N
17	GND	18	FDIRC-N
19	GND	20	FSTEP-N
21	GND	22	FWD-N
23	GND	24	FWE-N
25	GND	26	FTK0-N
27	GND	28	FWP-N
29	GND	30	FRDD-N
31	GND	32	FHS-N
33	GND	34	DCHG-N

### 12.13.3. Strap Settings / Adjustments Western Digital WD1003V-MM2



NOTE: \* INDICATES DEFAULT

### 12.13.5. Installation / Maintenance Western Digital WD1003V-MM2

The WD1003V-MM2 may be installed only in the AT option board slots. Check the strap settings before installation. Ensure that the drive cable connectors are plugged in correctly (check the reverse of the board, pin 1 of each connector has a square solder pad). Take care that the correct drive types are defined within SETUP.

## 12.14. ADAPTEC AHA-1542X

### 12.14.1. Characteristics Adaptec AHA-1542X

The Adaptec AHA-1542X is a dual port controller for:

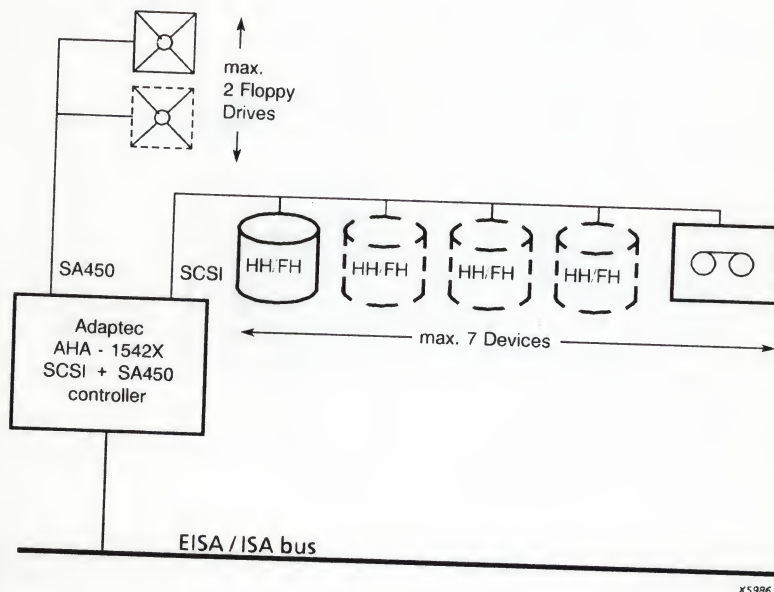
- SCSI devices (max. 7 devices e.g. Hard Disks, Streamer Tape Drives)
- SA450 Floppy Disk Drives (max. 2)

Two SCSI interfaces are available. One for devices which are mounted inside the system cabinet and one for the devices which are mounted in an extension cabinet.

It is possible to connect external LEDs for device activity indication (SCSI).

This option board is based on the AT-bus interface.

**NOTE:** There are two board-types: - Adaptec AHA-1542A (old version)  
- Adaptec AHA-1542B (new version)  
Both board-types are functionally the same. The differences are the board-size and the positions of the straps.





## 12.14.2. Connections Adaptec AHA-1542X

Internal Hard Disk Drive SCSI

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	SDAT0
3	4	SDAT1
5	6	SDAT2
7	8	SDAT3
9	10	SDAT4
11	12	SDAT5
13	14	SDAT6
15	16	SDAT7
17	18	SDP-N
19	20	GND
21	22	GND
23	24	GND
25 (NC)	26	+5Vdc (fused)
27	28	GND
29	30	GND
31	32	SATTN-N
33	34	GND
35	36	SBSY-N
37	38	SACK-N
39	40	SRST-N
41	42	SMSG-N
43	44	SSEL-N
45	46	SCD-N
47	48	SREQ-N
49	50	SIO-N

External Hard Disk Drive SCSI Interface  
(connector J3 of AHA-1542A or connector J4 of AHA-1542B)

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	SDAT0
3	4	SDAT1
5	6	SDAT2
7	8	SDAT3
9	10	SDAT4
11	12	SDAT5
13	14	SDAT6
15	16	SDAT7
17	18	SDP-N
19	20	GND
21	22	GND
23	24	GND
25 (NC)	26	+5Vdc (fused)
27	28	GND
29	30	GND
31	32	SATTN-N
33	34	GND
35	36	SBSY-N
37	38	SACK-N
39	40	SRST-N
41	42	SMSG-N
43	44	SSEL-N
45	46	SCD-N
47	48	SREQ-N
49	50	SIO-N

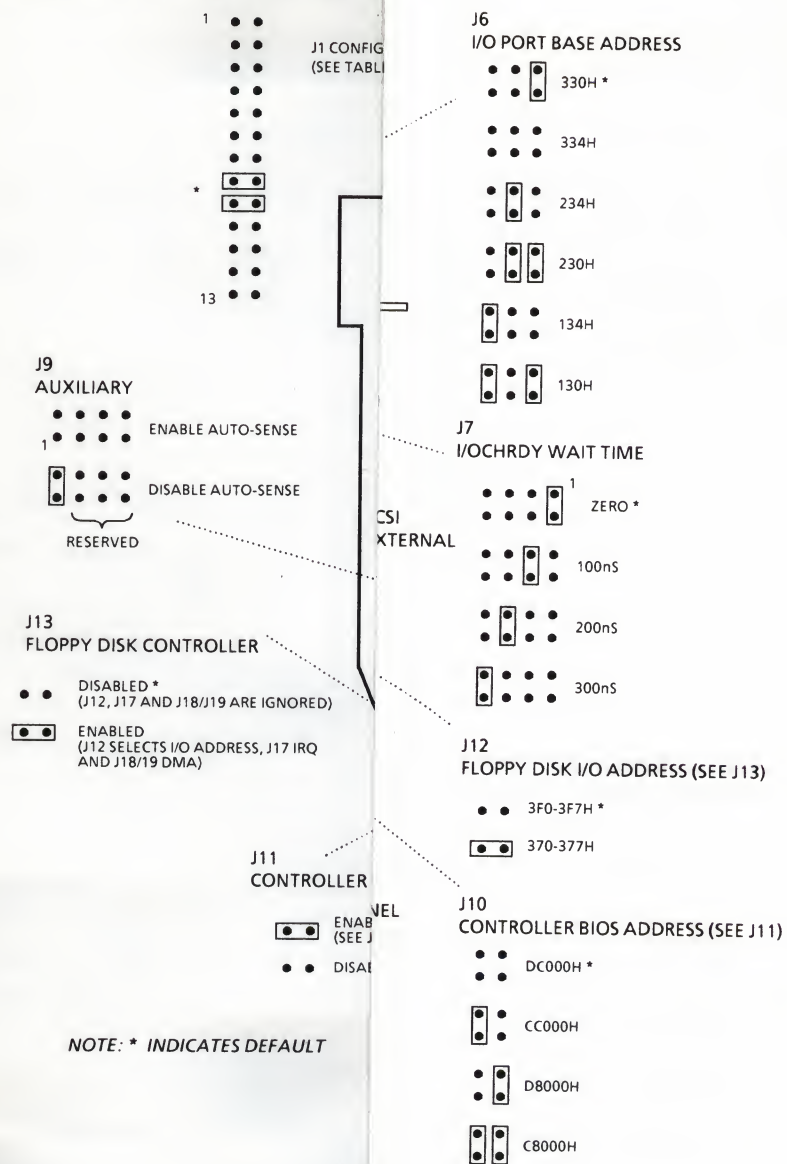
Floppy Disk Interface  
(connector J4 of AHA-1542A or connector J1 of AHA-1542B)

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	VCO'LD
3	4	NC
5 (KEY)	6	NC
7	8	INDEX-N
9	10	MOTA-N
11	12	SELB-N
13	14	SELA-N
15	16	MOTB-N
17	18	DIR-N
19	20	STEP-N
21	22	WRDATA-N
23	24	WRGATE-N
25	26	TRK0-N
27	28	WP-N
29	30	FDSEL
31	32	N.C.
33	34	DCHG-N

Hard Disk Drive LED Indicator Interface  
(connector J1 of AHA-1542A or connector J3 of AHA-1542B)

PIN No.	SIGNAL NAME
1	LED +
2	ACTIVE-N
3	ACTIVE-N
4	LED +

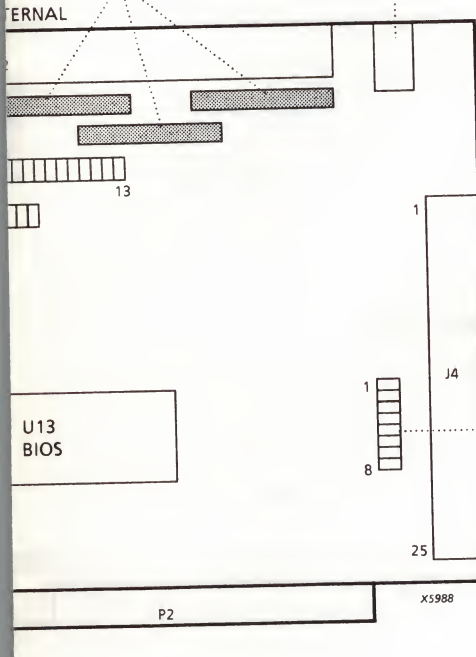
### 12.14.3. Strap Settings / Adjustme





IF THE AHA-1542B IS THE FIRST OR LAST DEVICE IN THE SCSI CHAIN, THESE TERMINATORS MUST BE PRESENT. OTHERWISE THEY MUST BE REMOVED

FIXED FUSE FOR 5V ON SCSI - BUS (TERMINATOR POWER)

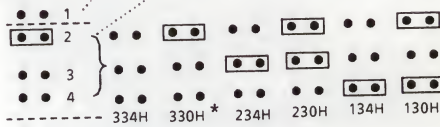


\* 1 ● ● FLOPPY DISK CONTROLLER I/O ADDRESS NOT USED  
1 ■ FLOPPY DISK CONTROLLER I/O ADDRESS 3F0H-3F7H

SCSI EXTERNAL

J7 AT - BUS

I/O PORT BASE ADDRESS



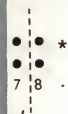
I/O CHRDY WAIT TIME

ZERO \* 100NS 200NS 300NS

CONTROLLER BIOS ADDRESS (SEE ALSO J6)

DC000 CC000 D8000 C8000 \* (HEX)

NOTE: \* INDICATES DEFAULT



INTERRUPT REQUEST FLOPPY

DUAL SPEED SPINDLE

ACK2



IRQ6

● NORMAL SPINDLE

ACK3



IRQ10

■ DUAL SPEED SPINDLE

ONS CE

9009

Configuration block J1 of AHA-1542A and J5 of AHA-1542B is used to configure various parameters of the controller as detailed in the following table. Note that the positions of pin 7-11 must match the positions of straps J14-J16 of AHA-1542A and straps J9 of AHA-1542B (refer to the previous pages).

J1 CONFIGURATION BLOCK (AHA-1542A) J5 CONFIGURATION BLOCK (AHA-1542B)													FUNCTION
1	2	3	4	5	6	7	8	9	10	11	12	13	
IN													Synchronous negotiation enabled Synchronous negotiation disabled
OUT													
	IN												Diagnostic mode enabled Diagnostic mode disabled
	OUT												
		IN											SCSI parity checking disabled SCSI parity checking enabled
		OUT											
			OUT	OUT	OUT								SCSI address 7 6 5 4 3 2 1 0
			IN	IN	IN								
			OUT	OUT	OUT								
			IN	IN	IN								
			OUT	OUT	OUT								
			IN	IN	IN								
			OUT	OUT	OUT								
			IN	IN	IN								
						OUT	OUT						DMA channel 7 6 5 0
						IN	IN						
						OUT	OUT						
						IN	IN						
								OUT	OUT	OUT			Interrupt request 9 10 11 12 14 15
								IN	IN	IN			
								OUT	OUT	OUT			
								IN	IN	IN			
								OUT	OUT	OUT			
								IN	IN	IN			
											OUT	OUT	DMA transfer speed 5.0 MB/s 5.7 MB/s 6.7 MB/s 8.0 MB/s
											IN	IN	
											OUT	OUT	
											IN	IN	

AHA-1540B S6  
444800B  
9030  
Rev. 4

434104-00B  
MODE FC8A  
1990

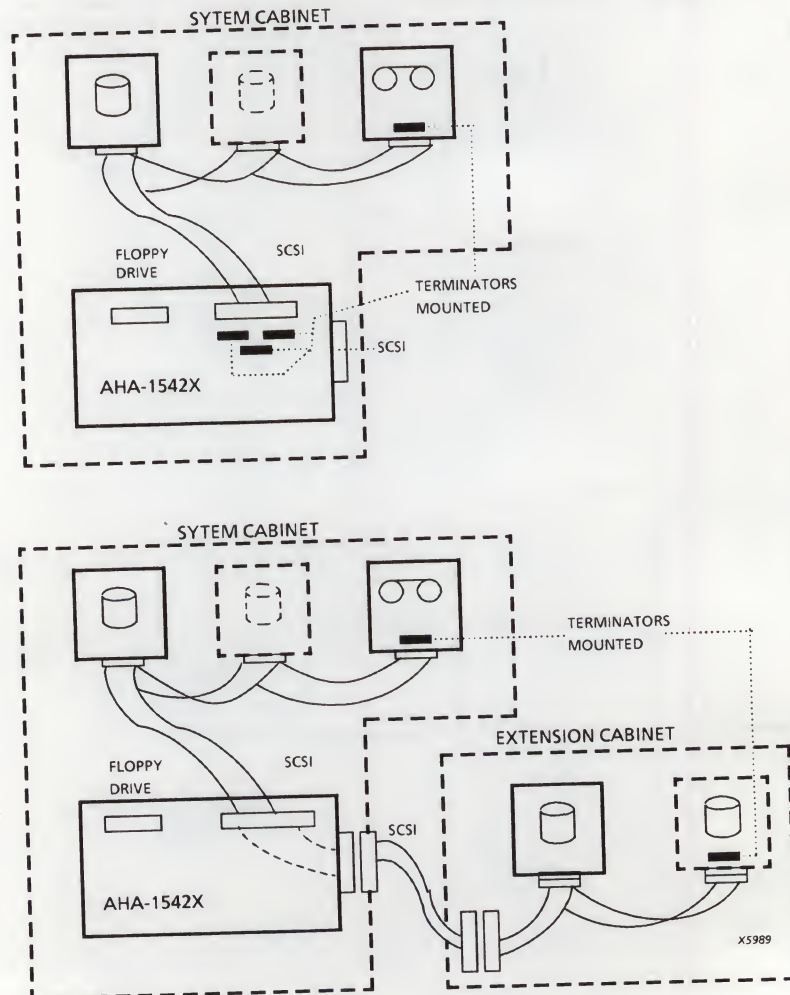
420418-00B  
B103 8C00  
1990

debug -g = C800:5

### 12.14.5. Installation / Maintenance Adaptec AHA-1542X

The Adaptec AHA-1542X must be installed in an AT expansion slot. Check the strap settings before installation. Ensure that the drive cable connectors are plugged in correctly.

The terminators for the SCSI interface are normally mounted. If both SCSI connectors are used (J2 and J3), then the terminators must be removed from the controller and terminators must be mounted on both last devices in the chain. Two examples are given in the following drawings



## 12.15. MITAC HARD DISK ADAPTER

### 12.15.1. Characteristics Mitac Hard Disk Adapter

The Mitac hard disk adapter is a general purpose adapter which interfaces a single AT hard disk drive with embedded controller.

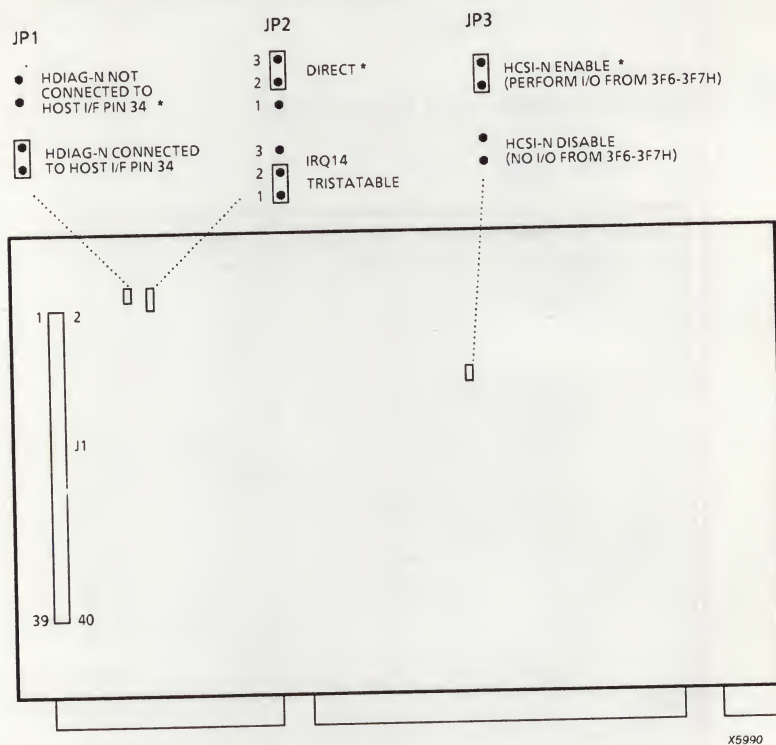
### 12.15.2. Connections Mitac Hard Disk Adapter

Hard Disk Drive Connector J1

PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
1	RST-N	21	N.C.
2	GND	22	GND
3	SD7	23	SIOW-N
4	SD8	24	GND
5	SD6	25	SIOR-N
6	SD9	26	GND
7	SD5	27	IOCHREADY
8	SD10	28	BALE
9	SD4	29	N.C.
10	SD11	30	GND
11	SD3	31	IRQ
12	SD12	32	IOCS16-N
13	SD2	33	SA1
14	SD13	34	N.C.
15	SD1	35	SA0
16	SD14	36	SA2
17	SD0	37	SCS0-N
18	SD15	38	SCS1-N
19	GND	39	ACTIVE-N
20	KEY	40	GND



### 12.15.3. Strap Settings / Adjustments Mitac Hard Disk Adapter



### 12.15.5. Installation / Maintenance Mitac Hard Disk Adapter

The Mitac hard disk adapter may be installed only in the AT option board slots. Check the strap settings before installation. Ensure that the drive cable connector is plugged in correctly (check the reverse of the board, pin 1 of the connector has a square solder pad). Take care that the correct drive type is defined within SETUP.

## 12.16. P9135/P9165 EXTERNAL BOOT OPTION

### 12.16.1. Characteristics P9135/P9165 External Boot Option

The P9135/P9165 external boot option contains the hardware necessary to install an external boot device in the P9135/P9165, when used in combination with Phoenix BIOS versions 1.10 04.C1 or later.

### 12.16.2. Connections P9135/P9165 External Boot Option

Hard Disk Drive Control Connector 1

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	GND	2	HS3-N
3	GND	4	HS2-N
5	GND	6	WG-N
7	GND	8	CONF/STATUS-N
9	GND	10	XFERACK-N
11	GND	12	ATTENTION-N
13	GND	14	HS0-N
15	GND	16	SECTOR-N
17	GND	18	HS1-N
19	GND	20	INDEX-N
21	GND	22	DRDY-N
23	GND	24	XFERREQ-N
25	GND	26	DS1-N
27	GND	28	DS2-N
29	GND	30	DS3-N
31	GND	32	RG-N
33	GND	34	COMMAND-N

## Hard Disk Drive Data Connector 2

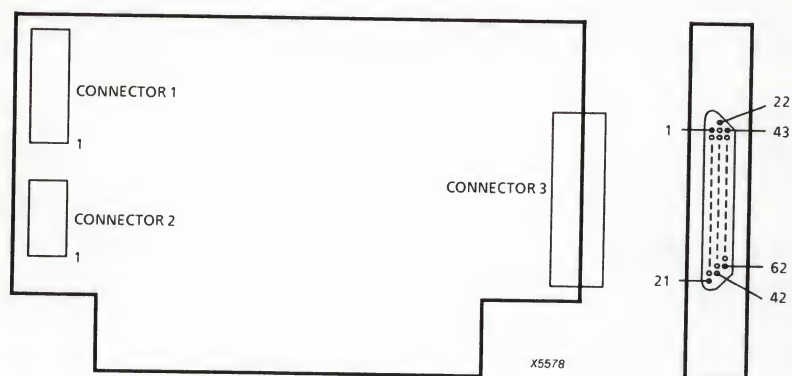
PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	DRVSLCT-N	2	SCTR/ADRFND
3	CMDCPLT-N	4	AMEN-N
5	GND	6	GND
7	WRCLK +	8	WRCLK-
9	GND	10	RDCLK +
11	RDCLK-	12	GND
13	WRDATA +	14	WRDATA-
15	GND	16	GND
17	RDDATA +	18	RDDATA-
19	GND	20	INDEX

## External Boot Device Connector 3

PIN	SIGNAL NAME	PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	DS3-N	22	RG-N	43	COMMAND-N
2	GND	23	GND	44	GND
3	XFERREQ-N	24	DS1-N	45	DS2-N
4	GND	25	GND	46	GND
5	HS1-N	26	INDEXJ1-N	47	DRDY-N
6	GND	27	GND	48	GND
7	ATTENTION-N	28	HS0-N	49	SECTORJ1-N
8	GND	29	GND	50	GND
9	WG-N	30	CONF/STATUS-N	51	XFERACK-N
10	GND	31	GND	52	GND
11	INDEXJ2-N	32	HS3-N	53	HS2-N
12	GND	33	GND	54	GND
13	GND	34	RDDATA-	55	RDDATA +
14	WRDATA +	35	GND	56	GND
15	GND	36	WRDATA-	57	GND
16	RDCLK-	37	GND	58	GND
17	GND	38	RDCLK +	59	GND
18	WRCLK +	39	GND	60	CMDCPLT-N
19	GND	40	WRCLK-	61	GND
20	SECTORJ2-N	41	GND	62	AMEN-N
21	GND	42	DS-N		

### 12.16.3. Strap Settings / Adjustments P9135/P9165 External Boot Option

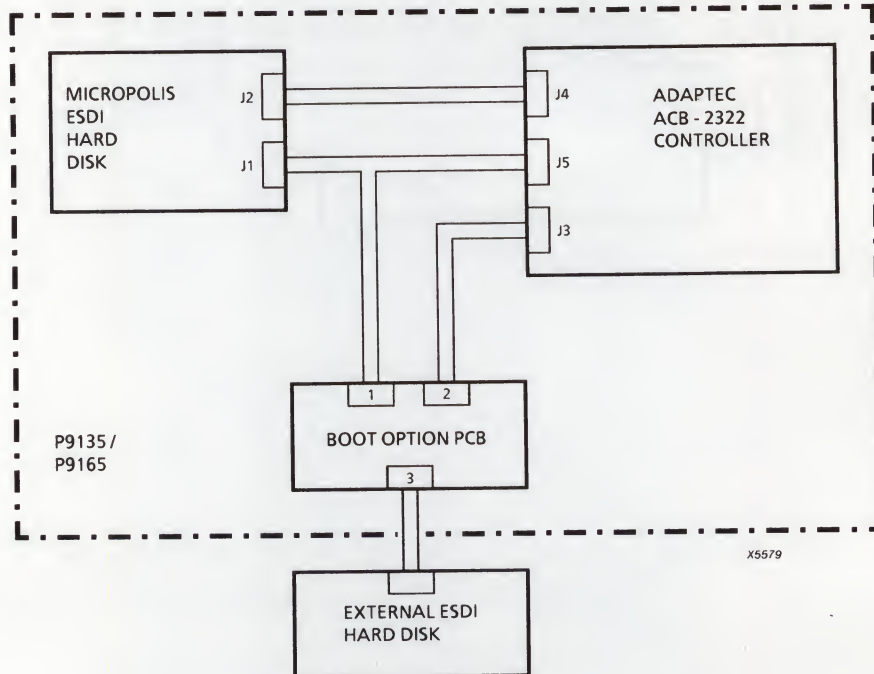
There are no strap settings or adjustments applicable for this device, however, the connectors and pin locations are given below.





### 12.16.5. Installation / Maintenance P9135/P9165 External Boot Option

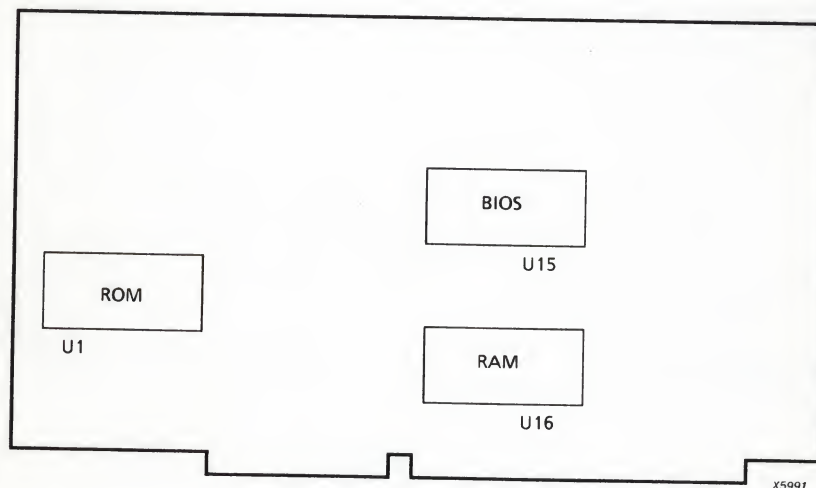
The external boot option PCB may be installed in any option board slot. The 34-way chain cable should be connected between J5 on the Adaptec ACB-2322 ESDI controller, J1 on the internal Micropolis ESDI hard disk drive and connector 1 on the boot option PCB. The 20-way ribbon cable should be connected between connector J3 on the Adaptec ACB-2322 ESDI controller and connector 2 on the boot option PCB. The external ESDI hard disk should be connected to connector 3 on the boot option PCB. An overview of this installation is given below.



## 12.17. ULTRA 12(F) ESDI CONTROLLER

### 12.17.1. Characteristics Ultra 12 (F) ESDI Controller

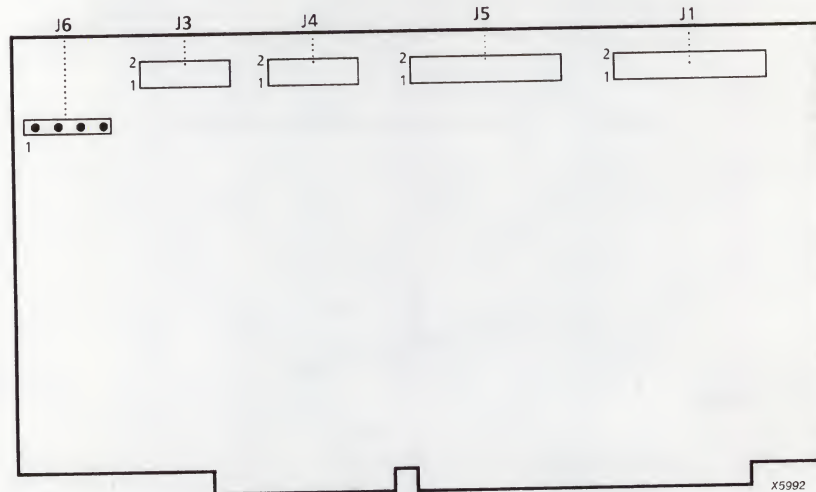
The Ultra 12(F) is an Enhanced Small Device Interface hard disk controller which controls up to 2 ESDI compatible hard disk drives. Both drives can have different transfer rates upto 20 Mbits per second. Also any mix of upto 3 flexible disk drives (5 $\frac{1}{4}$ " or 3 $\frac{1}{2}$ " ) or 2 flexible disk drives and a tape drive is supported. It also provides 8 KByte of RAM (located at U16) for full-track data buffering. On the controller board are 2 PROM's located. One is the BIOS and contains the Power On Diagnostics (U15) and the other (located at U1) contains a conversion program for disk drives with more than 1024 cylinders and more than 17 sectors per track (System BIOS limitation).



### 12.17.2. Connections Ultra 12(F) ESDI Controller

This board has 5 connectors :

- J1 Flexible drive signal connector
- J3 Hard disk drive data connector drive 1
- J4 Hard disk drive data connector drive 0
- J5 Hard disk drive control connector
- J6 Hard disk activity LED connector



Connector J1 :

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	WRITE CURRENT CONTROL-N
3	4	N.C.
No Pin 5	6	N.C.
7	8	INDEX-N
9	10	MOTOR ON 1-N
11	12	DRIVE SELECT 2-N
13	14	DRIVE SELECT 1-N
15	16	MOTOR ON 2-N
17	18	DIRECTION-N
19	20	STEP-N
21	22	WRITE DATA-N
23	24	WRITE GATE-N
25	26	TRACK 0-N
27	28	WRITE PROTECT-N
29	30	READ DATA-N
31	32	SIDE SELECT-N
33	34	DISKETTE CHANGE-N

Connector J3 and J4 :

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	DRIVE SELECTED-N	2	SECTOR ADDRESS MARK FOUND-N
3	COMMAND COMPLETE-N	4	ADDRESS MARK ENABLE-N
5	GROUND	6	GROUND
7	WRITE CLOCK	8	WRITE CLOCK-N
9	GROUND	10	READ CLOCK
11	READ CLOCK-N	12	GROUND
13	NRZ WRITE DATA	14	NRZ WRITE DATA-N
15	GROUND	16	GROUND
17	NRZ READ DATA	18	NRZ READ DATA-N
19	GROUND	20	INDEX-N



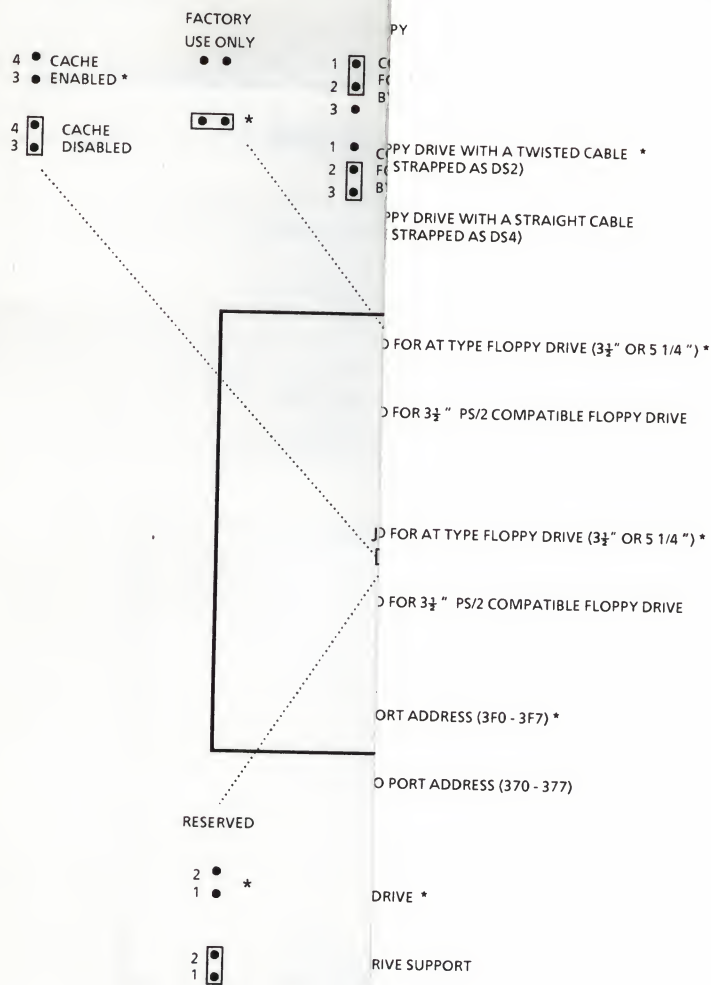
Connector J5 :

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	HEAD SELECT 2(3)-N
3	4	HEAD SELECT 2(2)-N
5	6	WRITE GATE-N
7	8	CONFIGURATION STATUS-N
9	10	TRANSFER ACK-N
11	12	ATTENTION-N
13	14	HEAD SELECT 2(0)-N
No Pin 15	16	SECTOR-N
17	18	HEAD SELECT 2(1)-N
19	20	INDEX-N
21	22	READY-N
23	24	TRANSFER REQ-N
25	26	DRIVE SELECT 2(0)-N
27	28	DRIVE SELECT 2(1)-N
29	30	DRIVE SELECT 2(2)-N
31	32	READ GATE-N
33	34	COMMAND-N

Connector J6 :

PIN NUMBER	SIGNAL NAME
1	LED +
2	LED -
3	LED -
4	LED +

### 12.17.3. Strap Settings / Adjustments



\* DEFAULT SETTING

VARIES ACCORDING TO FLOPPY DATA RATES \*

- 1) PRIMARY PORT ADDRESSES MUST USE C800
- SECONDARY PORT ADDRESSES MUST USE C1000
- JP12 SELECTS PRIMARY OR SECONDARY PORT

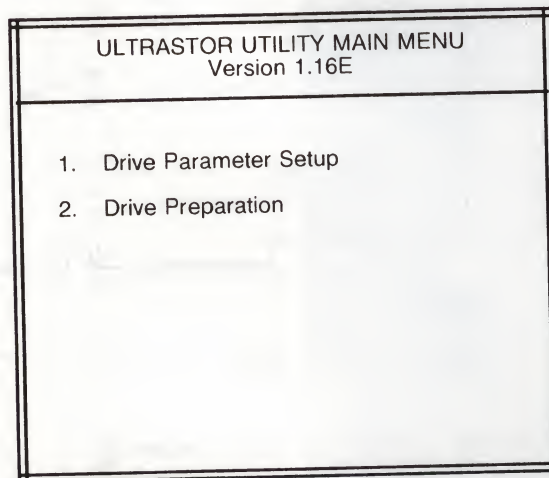
### 12.17.5. Installation / Maintenance Ultra 12(F) ESDI Controller

The Ultra 12(F) may be installed only in the AT option board slots. Check the strap settings before installing. Ensure that the drive cable connectors are plugged in correctly (check the reverse of the board, pin 1 of each connector has a square solder pad or check the pin numbers printed on the board). The left wire or right wire of the flat cable is marked with another color. This wire is connected to pin number one.

On-board is 8 KBytes of static RAM, used as data buffer located (U16). To keep up with fast I/O (15 or 20 Mbits ESDI drives with 1:1 interleave) this 8 KBytes SRAM chip can be replaced by a 32 KBytes SRAM chip.

The on-board BIOS contains a SETUP program. To start this SETUP program first start DEBUG.COM. Then after the DEBUG prompt (">") type "g=C800:5<ENTER>". C800 is the default BIOS address. Via the strap settings of JP10 this BIOS address can be changed to avoid possible conflicts with another BIOS (see sub-section 12.17.3.).

After starting that SETUP program the following menu appears on screen.



Use arrow keys to select, <ENTER> to execute  
ESC to exit

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## Drive Parameter Setup

If this option is chosen from the main menu, the next screen appears.

UltraStor BIOS Setup Menu (C) USC 1989			
Drive 0 Parameters		Drive 1 Parameters	
Type	ESDI	Type	NONE
Cylinder	1457	Cylinder	0
Head	16	Head	0
Sector	57	Sector	0
Precomp	65535	Precomp	0
LandingZone	1457	LandingZone	0
One Spare Sector/Trk	NO	One Spare Sector/Trk	NO
Sector Mapping	NO	Sector Mapping	NO
Track Mapping	NO	Track Mapping	NO
1024 Cyl Truncation	NO	1024 Cyl Truncation	NO

Use arrow keys to change field. SPACE BAR to select options  
Use ESC key to exit, F10 to save

The on-board utility will read the hard disk drive(s) parameters from the attached ESDI hard disk drive(s) and put the values in the appropriate fields on the screen. Only 4 options are user selectable for each drive:

- One Spare Sector/Trk : NO No spare track reserved on hard disk.  
YES A spare track is reserved on hard disk.
- Sector Mapping : NO No sector mapping will be performed. The disks physical parameters will be used.  
17 17 sector mapping will be performed. This is used to run software which fixes the sectors per track to 17.  
32 32 sector mapping will be performed. This option is an alternative to the 63 sector mapping in the event that the application software cannot function with a large sector per track number.  
63 63 sector mapping will be performed. This option is used when the drive has over 1024 cylinders and allows users to get around the 1024 cylinders AT system BIOS limitation and utilize the full capacity of the drive (upto 528MB).



- Track Mapping : NO No track mapping will be performed.  
YES Track mapping is performed to overcome the AT interface limitation under DOS of 528MB. It is then possible to use drives that are greater than 528MB without special software. This cannot be used under Novell, OS/2 or Unix Xenix operating systems.
- 1024 Cyl Truncation : NO 1024 cylinders truncation will not be performed.  
YES Cylinder number will be truncated to 1024 to allow operating systems that cannot use track mapping to overcome the 1024 cylinders limitation. This is used in OS/2 applications with drives greater than 528MB.

When all the appropriate options have been entered, press F10 to save and F5 to confirm execution. The CMOS RAM will be updated with the correct number of hard disk drives and then the system boots up again under DOS.

### Drive Preparation

When the drive parameters have been set up correctly according to the Drive Parameter Setup screen, the drive is ready to be low level formatted. This is done via the second option in the utility main menu (Drive Preparation).  
If this option is chosen from the main menu, the next screen appears.

Hard Disk Drive Preparation Menu							(C) USC 1989
Drive 0	Interleave 1	HdSkew 2	CylSkew 16	AutoFormat Brief	DefectList Retrieve	Primitives Verify	
Drive 0	Cylinder 1747	Head 4	Sector 54	Precomp NONE	LandingZone 1747	Capacity (MB) 338.1	
<p style="text-align: center;">Defect List</p> <p>HD/ CYL/ SC/ BFI/ LEN   HD/ CYL/ SC/ BFI/ LEN   HD/ CYL/ SC/ BFI/ LEN</p>							

Use arrow keys to change field, SPACE BAR to select options  
Use ESC key to exit, <ENTER> to execute, F1 to pause/continue

- Drive : Choose drive 0 or drive 1 to be prepared.
- Interleave : Set interleave factor from 0 to 9 (0,1 provide both 1:1 interleave)
- HdSkew : Head Skew can be programmed from 0 to 15 (0 means no head skew will be performed). The default is 2 and provides sufficient head skew for most drives unless the drive uses embedded or sector servo. In that case the head skew must be 9 or higher.
- CylSkew : Cylinder Skew can be programmed from 0 to 25 (0 means no cylinder skew will be performed).
- AutoFormat : After choosen this option the drive will be formatted automatically. Four options are provided :
  - Brief The controller does the following
    - Retrieve the drive defect list from the ESDI drive.
    - Low level format the entire drive.
    - Format the factory defects as bad sectors.
    - Verify the entire drive and record any additional grown bad spots.
    - Store the grown defect list discovered during drive verification.
    - Format the grown defects as bad sectors.
  - Extended The sequence and commands are the same as described with option Brief, only now AutoFormat will use a write and verify command instead of the verify command used in Brief AutoFormat. So Extended AutoFormat will take much longer to prepare the drive.
  - Brief-N Same as Brief AutoFormat, but Brief-N will additionally perform the following steps
    - Scan the entire disk and create the defect list structure compatible with Novell.
  - Extended-N Same as Extended AutoFormat, but Extended-N will also perform the same additional steps as described in Brief-N.
- DefectList : With this option the user can manipulate the defect list manually. Five options are provided :
  - Retrieve Retrieve the defect list from the ESDI drive.
  - Add Entry Add defect entries to the original list.
  - Del Entry Delete grown defect list entries.
  - Store Store the defect list shown on the screen to the drive.
  - ClrEntries Clear the screen.

- Primitives

This option allows the user to get into the low level disk functions.

Five options are provided :

Format      Low level format the entire disk.

Wrt & Vrfy      The controller will write data patterns to the drive and verify each pattern.

Verify      The data integrity of the drive will be verified.

LockDefect      This command takes the defect list information on the screen and maps out those defects from the drive. They are formatted as bad sectors.

Scan-N      This option scans the entire disk and creates the defect list structure compatible with Novell.

## 12.18. MYLEX SCSI CONTROLLER

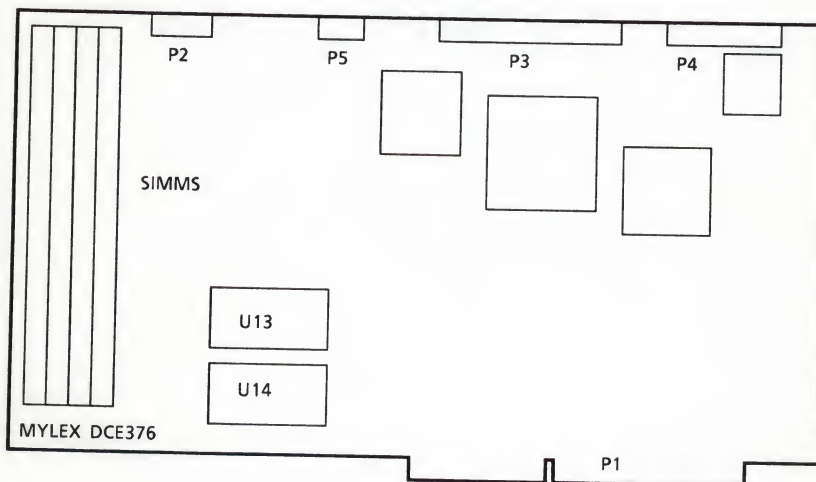
### 12.18.1. Characteristics Mylex SCSI Controller

The MYLEX DCE376 SCSI controller is a 32-bit Caching SCSI controller  
The bus of the Mylex DCE376 SCSI controller is the EISA bus

### 12.18.2. Connections Mylex SCSI Controller

This board has 5 connectors :

- P1 EISA Bus Connector
- P2 Not Used
- P3 SCSI Cable Connector
- P4 Floppy Disk Drive Connector
- P5 Disk Activity Light Connector





External Hard Disk Drive SCSI Interface (connector P3)

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	SDAT0
3	4	SDAT1
5	6	SDAT2
7	8	SDAT3
9	10	SDAT4
11	12	SDAT5
13	14	SDAT6
15	16	SDAT7
17	18	SDP-N
19	20	GND
21	22	GND
23	24	GND
25 (NC)	26	+ 5Vdc (fused)
27	28	GND
29	30	GND
31	32	SATTN-N
33	34	GND
35	36	SBSY-N
37	38	SACK-N
39	40	SRST-N
41	42	SMSG-N
43	44	SSEL-N
45	46	SCD-N
47	48	SREQ-N
49	50	SIO-N

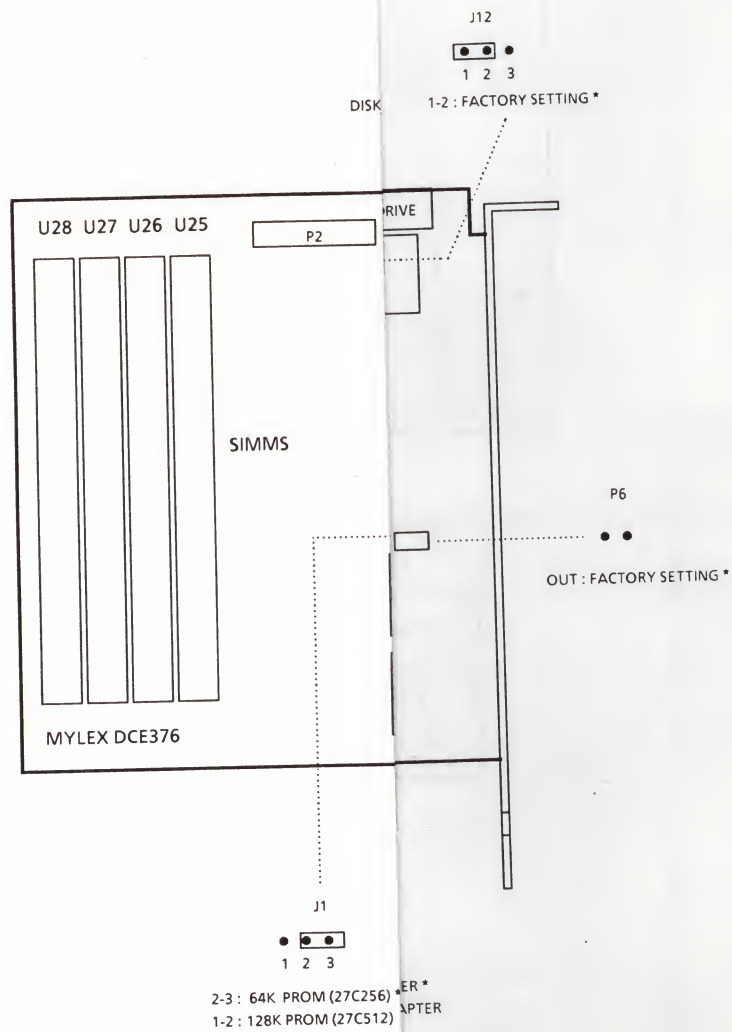
# Floppy Disk Interface (connector P4)

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
1	2	VCO/LD
3	4	NC
5 (KEY)	6	NC
7	8	INDEX-N
9	10	MOT-A-N
11	12	SELB-N
13	14	SELA-N
15	16	MOTB-N
17	18	DIR-N
19	20	STEP-N
21	22	WRDATA-N
23	24	WRGATE-N
25	26	TRK0-N
27	28	WP-N
29	30	HDSEL
31	32	N.C.
33	34	DCHG-N

# Hard Disk Activity Light Interface (connector P5)

PIN No.	SIGNAL NAME
1	LED +
2	ACTIVE-N
3	ACTIVE-N
4	LED +

### 12.18.3. Strap Settings/Adjustment



\* : DEFAULT SETTING

### 12.18.5. Installation / Maintenance MYLEX SCSI Controller

Complete the following steps to insert the board into your EISA system. This procedure assumes that all SCSI hard disk drives have been properly installed with cables attached. There should be a ribbon cable available for the SCSI disk drives. Normally the floppy disk drive controller on the mother board is used. It is also possible to use the floppy disk drive controller on the MYLEX card (change in this case the strapsetting see 12.18.3)

- Make sure power is off to the system.
- Remove the computer's cover according to the system's manufacturer.
- Remove the holding screw and expansion slot bracket from the available 32-bit slot nearest the disk drives, placing the screw and bracket to one side.
- Insert the board into the slot and attach it with the screw you removed in the step above.
- Attach the the SCSI ribbon cable to the connector P3.
- In case the the floppy disk drive on the Mylex card is used attach the floppy disk drive cable to the connector P4.
- Make sure that all ribbon cables are folded or routed so that they do not interfere with the enclosure top.
- Replace the cover according to the manufacturer's directions.

EISA systems include a configuration utility (ECU diskette) that will resolve device conflicts and program an EISA peripheral board such as the DCE376 to use the proper I/O bus resources such as IRQ lines and I/O ports. In order for the configuration utility to work, each peripheral board is required to have a configuration data base file. For the DCE376, this file is found on the DOS driver diskette included in the DCE376 package. The file name is !MLX0020.CFG.

To use the configuration utility refer to the chapter 2.2 of the P3464 customer engineer manual. In general the following steps are required:

- Copy the !MLX0020.CFG file to the configuration utility diskette (ECU diskette)
- Start the configuration utility from the diskette
- Select the DCE376 device from the configuration menu.

For the software installation refer to the user manual .





## 12.19. ADAPTEC AHA-1740

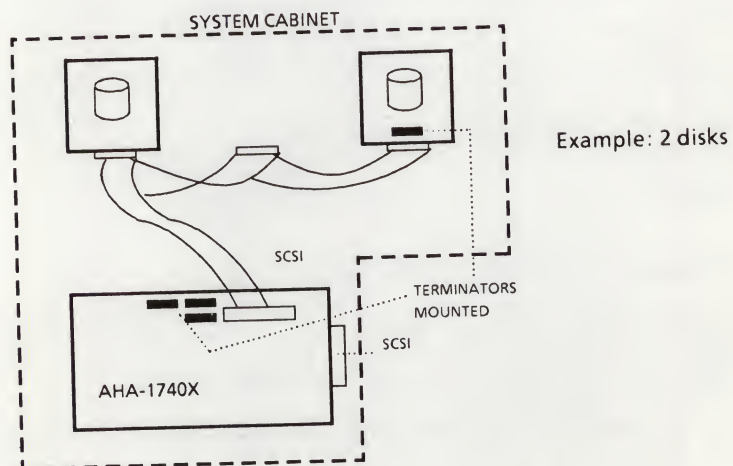
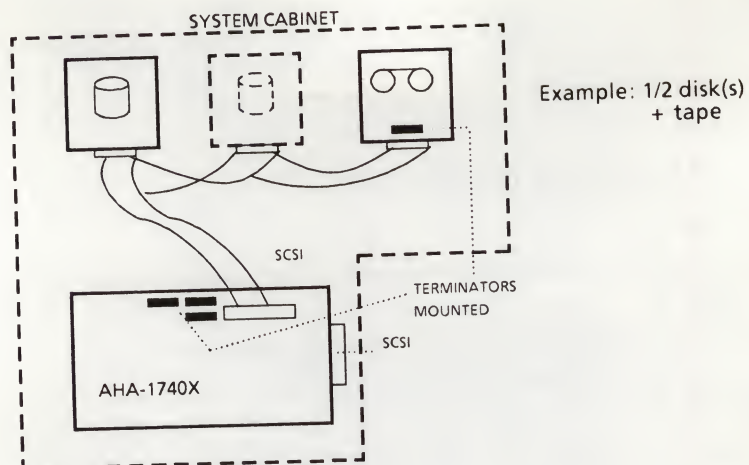
The Adaptec AHA-1740 provides a powerful multitasking interface between the Extended Industry Standard Architecture (EISA) bus and the Small Computer System Interface (SCSI) bus. The AHA-1740 host adapter provides high-performance host adapter circuitry connected to the more common single ended SCSI bus, capable of running normal SCSI speeds of up to 5 MBytes/second with cable lengths up to 18 feet.

### 12.19.1. Characteristics Adaptec AHA-1740

Technical data:

HARD DISK CONT. PART	
Physical Dimensions	Length: 13 3/8", Width: 5 8", Height: 5", Standard EISA-compatible form factor
Power Requirements	+ 5.0 $\pm$ 0.25 VDC, 2.9 A
Buffer Size	FIFO, 1 KBytes. RAM, 64 KBytes
Interface SCSI	Single ended, up to 5 MBytes second, up to 5.5 meter High-density SCSI-2 external connector in addition to internal SCSI connector
Interface EISA	Bus Master Transfers with Burst Cycles, data rate 33 MBytes/second The card can not be used on the ISA bus (AT or XT)
BIOS	Bootable BIOS for standard hard disk emulation Downloadable microcode for flexible operation and upgrades (ADL)
Operation modes Selectable with the ADL utility (Adaptec Down Load utility) Disk Performance Manager required ( )	Compatible Mode: For software drivers, used for AHA-1540 or AHA-1640 families, to run unaltered on the AHA-1740 family Enhanced Mode: EISA-bus: 32-bit addressing All EISA board registers can be used Single fast mailbox handling SCSI-bus: Contingent allegiance Tagged queuing
BIOS Base Addresses	CC000 <sub>h</sub> , D0000 <sub>h</sub> , D4000 <sub>h</sub> , D8000 <sub>h</sub> , DC000 <sub>h</sub> , E0000 <sub>h</sub>
Interrupts	IRQ 9, 10, 11, 12, 14, 15
DMA Channels	DMA 5, 6, 7, 0
I/O Addresses	330h, 230h, 130h, 334h, 234h, 134h (Standard mode only)
SCSI ID's	ID 7, 6, 5, 4, 3, 2, 1, 0 (Normally the highest SCSI-priority (ID 7) is reserved for the host adapter)

## 12.19.2. Connections Adaptec AHA-1740

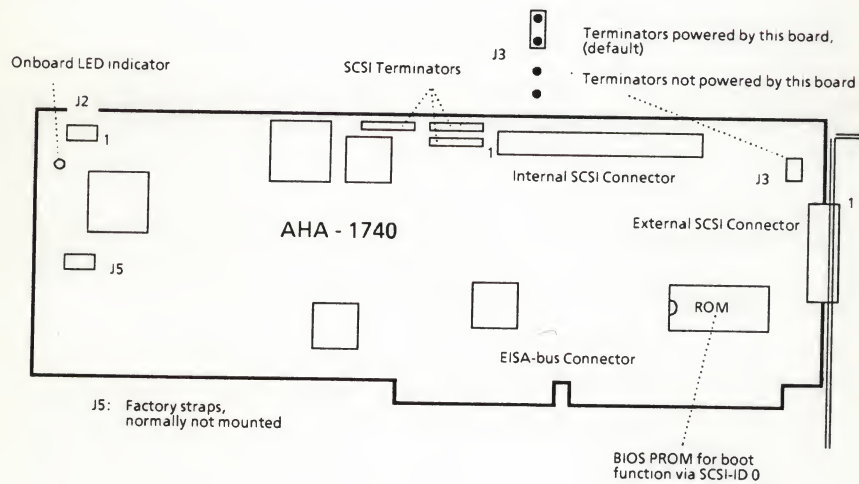


## SCSI Activity LED Indicator Connector J2

Front LED should be connected to pin 1 and 2 of J2

PIN No.	SIGNAL NAME
1	LED +
2	ACTIVE-N
3	ACTIVE-N
4	LED +

## 12.19.3. Strap Settings / Adjustments Adaptec AHA-1740





#### 12.19.4. Modification History Adaptec AHA-1740

SI-No.	SUBJECT	12NC

#### 12.19.5. Installation / Maintenance Adaptec AHA-1740

Before installing the Adaptec AHA-1740 in the EISA option slot of the system, ensure:

- that the strap J3 (section 12.19.3.) has been mounted (normally the terminator power is coming from the Adaptec AHA-1740)
  - that the terminators have been mounted correctly (normally mounted on the controller and on the device at the end of the chain). When both SCSI connectors J2 and J3 are used, then the terminators on the AHA1740 must be removed and terminators must be mounted on the two devices at the end of the chain.
- Two examples are given in the drawings in section 12.19.2.

Check if the SCSI cable connectors have been plugged in correctly.

For connection to the disk extension cabinet the external SCSI cable with high density connector (type 153) has to be used.

##### EISA Configuration Utility (ECU)

Run ECU to add the AHA1740 to the configuration description in the EISA CMOS.

The by default selected "Standard Mode" must not be used and thus the following selection possibilities have to be altered to the "Enhanced Mode":

- Host Adapter Interface Mode . . . . .	Enhanced Mode
- Standard Mode Resource Selection,	
- I/O Port Definition . . . . .	Disabled (Enhanced Mode)
- DMA Channnel Definition . . . . .	Disabled (Enhanced Mode)
- Host Adapter BIOS . . . . .	BIOS Base Address E0000h
- Host Adapter SCSI ID . . . . .	Device ID 7
- SCSI Bus Reset at Power -on . . . . .	Enable SCSI bus reset
- SCSI Device Configuration . . . . .	Press <ENTER> to set SCSI Configuration Options

The first adapter must have the BIOS enabled on address E0000h.

For other AHA-1740 adapters the BIOS must be disabled. The SCSI Configuration Options must be set to Enhanced Mode. The SCSI Device Configurations should have the default values. The order of adapters is determined by slot position. The software searches for adapters from high to low slot numbers. The system disk must have SCSI ID 0 and must be connected to the first controller (highest slot number).

An EISA system should contain either AHA-1542B or AHA-1740 adapters. A mix of these adapters within one system is not supported.

### 12.19.6. Diagnostic Functions Adaptec AHA-1740

On the Adaptec AHA-1740 a Light Emitting Diode (LED) is mounted which has two functions:

- 1) error indication during power-on test:
  - after power-on the LED turns on and remains on until the end of the diagnostic self-test;
  - if an error is detected the LED is flashing as shown in the table:

Error Indication of LED	Meaning of failures of Diagnostic Self Test
LED remains on	<ul style="list-style-type: none"><li>- control processor of Adaptec AHA-1740 inoperative or,</li><li>- terminators missing or not powered or cable orientation probably reversed or,</li><li>- card enable has not been asserted after reset.</li></ul>
1 flash	RAM test failed
2 flashes	AIC-6250 SCSI protocol chip verification failed
3 flashes	FIFO write/read data path test failed
continuous flashes	EEPROM has not been programmed

- 2) IO indication:
  - between system and Adaptec AHA-1740 (EISA-bus activity)
  - between Adaptec AHA-1740 and devices (SCSI activity)

**NOTE:** *The same functions as described above are valid for the external LED which can be connected to J2 (pins 1 and 2) of the Adaptec AHA-1740.*





## Product Description

This document describes the hardware and software installation of the WD1006V-MM1 and WD1006V-MM2, 16-bit disk controllers for the IBM® Personal Computer AT® or AT compatible computer. Both controllers\* Winchester interface to the IBM ST506/ST412 specifications. The WD1006V-MM2 is a floppy controller supports four floppy drive types (360 KB, 720 KB, 1.2 MB, and 1.44 MB). Do not confuse the number of drive types with the number of floppy drives that can be connected to the WD1006V-MM2. Only two internal floppy drives may beaisy chained to J1. The WD1006V-MM2 supports "intelligent" 1.44 MB media drives. These intelligent drives obtain the drive type and data rate from the drive's media and do not depend upon the state of J1 pin 2 for this information.

## Installation

This section briefly describes the installation of the controller board. Do NOT use the WD1006V-MM2 with an AT configured, AT compatible, or XT\* floppy controller in the same system. Removal of the extra floppy controller is necessary for proper operation of the WD1006V-MM2. Disabling the floppy controller on the WD1006V-MM2 is NOT possible.

A minor incompatibility exists between the WD1006V-MM1 (or WD1006V-MM2) and the WD1003-WAH (or WD1003-WA2). If the drive contains more than eight heads, e.g. a 16 head drive, the WD1003-WAH numbers heads 8 through 15 as 0 through 7 in media's ID fields. The WD1006V controllers number heads 8 through 15 as 8 through 15. To correct this problem, install a jumper on W1 pin 7-8 when using the WD1006V controller on a drive formatted with the WD1003-WAH (WD1003-WA2). This problem is not manifested in drives with less than eight heads.

## CAUTION

Handle the controller board by the ends of the board. Some of the chips are static sensitive and damage may occur if the board is incorrectly handled.

1. Verify the controller jumper settings. Only verify the settings. Modification of the standard factory settings is rarely necessary. Modify jumpers only under the direction of a qualified individual. Refer to the Figure 1 illustrates the jumper locations for both controller boards. Refer to Table 1 for further information on jumper settings.

2. Verify termination on last drive. Verify proper setting of drive select switches. Consult the drive technical manual for proper drive termination and selection information.

\*IBM and AT are registered trademarks and XT is a trademark of International Business Machines Corporation.

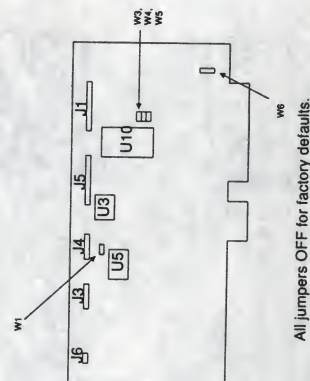
TABLE 1. JUMPER SETTINGS

Jumper*/Pin number	Position	Description
W1/1-2	OFF	Winchester(s) in latched mode.
	ON	Winchester(s) in non-latched mode.
3-4	OFF	Four byte ECC. ON reserved.
5-6	OFF	Caching enabled.
	ON	Caching disabled.
7-8	OFF	Format incompatible with WD1003-WAH (WD1003-WA2).
	ON	Format compatible with WD1003-WAH (WD1003-WA2).
W3/1-2	OFF	Primary Winchester I/O addresses
	ON	Secondary Winchester I/O addresses
W4/1-2	OFF	Primary floppy I/O addresses.
	ON	Secondary floppy I/O addresses
W5/1-2	OFF	Single speed floppy drives.**
	ON	Dual speed floppy drives.**
W6/1-2	OFF	Bracket ground option not used.
	ON	Connects bracket to board ground.

\*Not all jumper headers are installed. Modify jumpers only under the direction of a qualified individual.

\*\*Do not combine single and dual speed drives in the same system.

3. Remove the blank expansion slot bracket. Put the screw in the blank expansion slot. Put the screw in the blank expansion slot. Put the screw in the blank expansion slot.
4. Attach the control cable to drive(s).
5. Attach the control cable to drive(s).
6. Attach drive 0 data cable connector to J4.
7. Attach data cable to drive 0.
8. Attach drive 1 data cable connector to J3.
9. Attach data cable to drive 1.
10. For WD1006V-MM2 users, attach the floppy cable connector to J1.
11. For WD1006V-MM2 users, attach cable to floppy drive(s).
12. Attach the Winchester activity cable connector to J6.
13. Check the cable connections carefully. Ensure that pin 1 on the board connectors mates with pin 1 on the cable connectors. Pin 1 on the cable connectors is usually on the color coded side.
14. Install the controller board into the expansion slot. Make sure that the board is seated properly by pressing down on both ends of the board. Secure the board with the bracket screw.
15. Remove or disable any other floppy controller in your system. The WD floppy controller can not be disabled.



All jumpers OFF for factory defaults.

Figure 1. Jumper Locations

WD 1006 MM1 (Pcd only)  
MM2 (Pdd and Pcd)



## Software Installation

This section contains instructions for low level formatting the Winchester drives.

1. Insert your Advanced diagnostic diskette (or equivalent for AT compatibles).
2. Turn on the power.
3. Boot the diagnostic and select the setup option.

### CAUTION

Avoid system damage by consulting your system technical reference manual to ensure that your Winchester drive type is supported by the host BIOS drive tables. Not all AT compatibles share the same drive tables as IBM.

4. Select proper drive type. Consult the technical reference manual for further information on these parameters.

### CAUTION

Step 5 requires execution of low level format. Use of the IBM Advanced Diagnostic (or similar program for IBM compatibles) is necessary since these controllers contain no on-board basic Input/Output System (BIOS) ROM. Furthermore, the low level format destroys all data on the drive. If the drive contains useful data, backup the drive before executing the low level format program.

5. Insert the Advanced Diagnostic diskette and execute the low level format.
6. Load and execute the FDISK and FORMAT programs.

## Radio Frequency Interference Statement

This Western Digital product has been tested to comply with Part 15 of the FCC Rules. The product is designed and manufactured to meet the requirements of the Rules.

This does not guarantee that interference will not occur in individual installations. Western Digital is not responsible for any television, radio, or other interference caused by unauthorized modifications of this product. If interference problems do occur, please consult the system equipment owner's manual for suggestions. Shielded cables and equipment grounding are recommended. Shielded cables should be connected to the system by placing the AC power connection on a different circuit or outlet. The product was tested with a shielded interconnecting cable. Therefore, a shielded cable is required to be used with this product.

If you require further information or other technical support, please contact your authorized dealer:

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## USER'S GUIDE

**WD1006V-MM1  
Winchester Disk  
Controller  
WD1006V-MM2  
Winchester/Floppy  
Disk Controller**

Important Information  
Do Not Discard

**WESTERN DIGITAL**

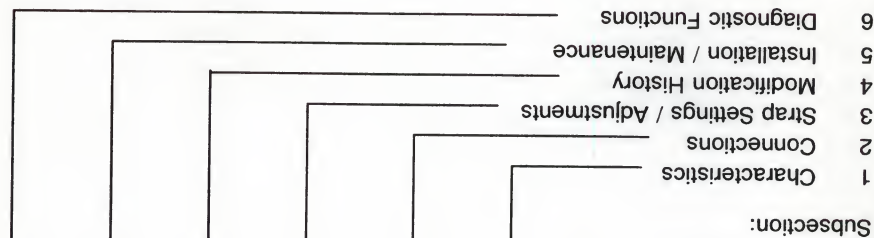
# 13. TAPE CONTROL UNITS

Section:

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1	: Technical Overview	13.1-1
1.1	: Option Cross Reference	13.1-1
1.2	: Technical Data	13.1-2

2	ARCHIVE SC499	13.2-1	13.2-1	13.2-3	13.2-4	13.2-4	13.2-5
3	ARCHIVE SC499R	13.3-1	13.3-1	13.3-3	13.3-4	13.3-4	13.3-5
4	ARCHIVE SC402	13.4-1	13.4-1	13.4-3	n.a.	13.4-4	n.a.



**NOTE:** n.a. means that this section is not available for this unit.



### 13.1. TECHNICAL OVERVIEW

13.1.1. Option Cross Reference Guide

[illegible]



## 13.1.2. Technical Data

SPECIFICATION	ARCHIVE SC 499	ARCHIVE SC 499R	ARCHIVE SC 402
Used interrupt	IRQ 2,3,4,5,6 or 7	IRQ 2,3,4,5,6 or 7	IRQ 1,3,4,5,6,7 or 9
DMA Channel	DRQ 1,2 or 3	DRQ 1,2 or 3	DRQ 1,2 or 3
I/O Address	000..007 up to 3F8..3FF	000..007 up to 7F8..7FF	000..007 up to 7F8..7FF
System Interface	QIC 02	QIC 02	QIC 02
Drive Interface	QIC 36	QIC 36	QIC 36
Tape Format	QIC 11 or QIC 24	QIC 11 or QIC 24	QIC 120 or QIC 150

## 13.2. ARCHIVE SC499

### 13.2.1. Characteristics ARCHIVE SC499

The SC499 Tape Controller interfaces the ARCHIVE 5945C  $\frac{1}{4}$ -inch cartridge tape drive.

### 13.2.2. Connections ARCHIVE SC499

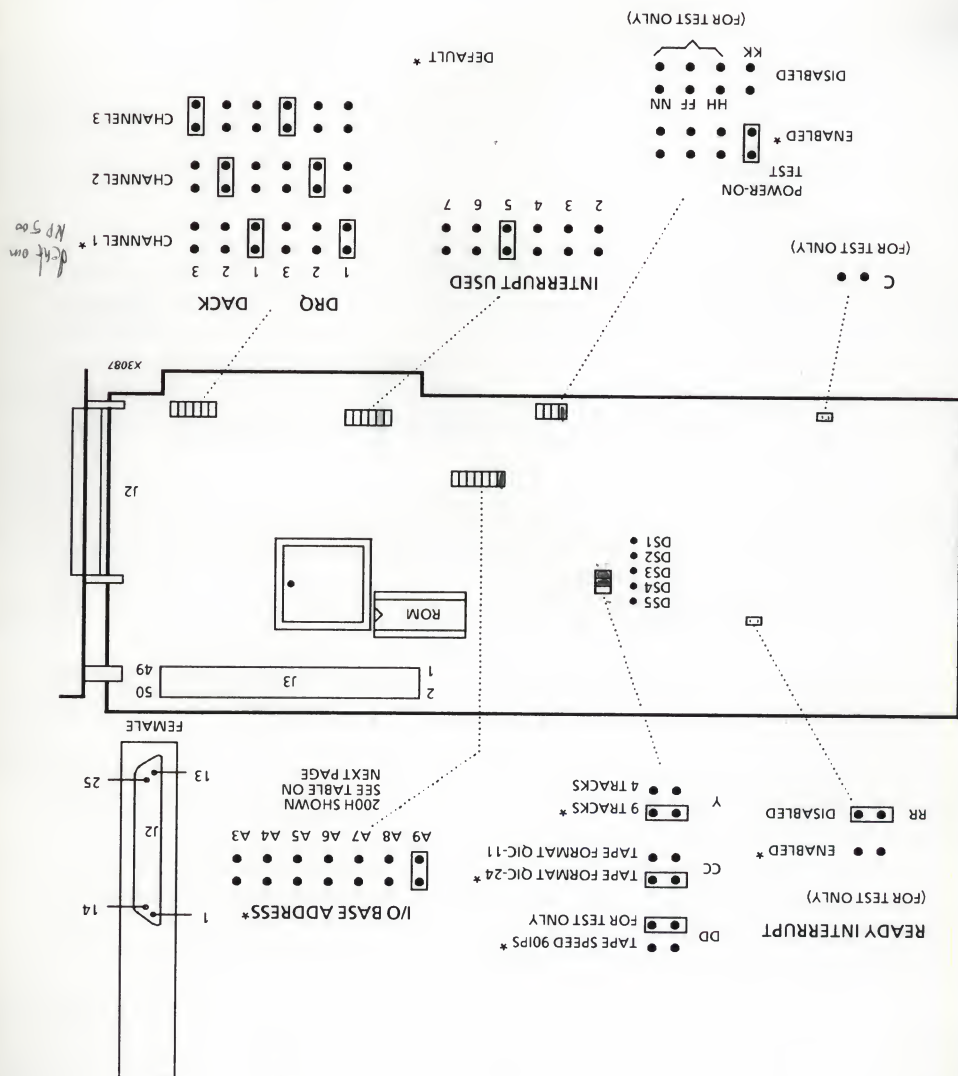
Tape Drive Connector J2

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	EEN-N	14	WEN-N
2	HSD-N	15	GND
3	GND	16	WDA +
4	GND	17	WDA-N
5	TCH-N	18	USF-N
6	CIN-N	19	GND
7	LTH-N	20	UTH-N
8	GND	21	RDP-N
9	HC-N	22	DSO-N
10	RST-N	23	TR0-N
11	TR1-N	24	TR2-N
12	TR3-N	25	REV-N
13	GO-N		

Tape Drive Connector J3

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
01	02	GO-N
03	04	REV-N
05	06	TR3-N
07	08	TR2-N
09	10	TR1-N
11	12	TR0-N
13	14	RST-N
15	16	Reserved
17	18	Reserved
19	20	Reserved
21	22	DSO-N
23	24	HC-N
25	26	RDP-N
27	28	UTH-N
29	30	LTH-N
31	32	Reserved
33	34	CIN-N
35	36	USF-N
37	38	TCH-N
39	40	WDA-N
41	42	WDA +
43	44	Reserved
45	46	HSD-N
47	48	WEN-N
49	50	EEN-N

# 13.2.3. Strap Settings / Adjustments ARCHIVE SC499





I/O Base Address Selection

The base I/O address is strap selectable. The base I/O address range can be from 000H-007H up to 3F8H-3FFH (all ranges are on 8-byte boundaries). Straps A3 through A9 are representing a part of the binary base I/O address. A strap installed corresponds with a logical '1', and a strap removed corresponds with a logical '0'. The table below gives two examples.

STRAP A9	STRAP A8	STRAP A7	STRAP A6	STRAP A5	STRAP A4	STRAP A3	BASE I/O ADDRESS
IN	OUT	OUT	OUT	OUT	OUT	OUT	
'1'	'0'	'0'	'0'	'0'	'0'	'0'	200H
IN	OUT	IN	OUT	IN	OUT	OUT	
'1'	'0'	'1'	'0'	'1'	'0'	'0'	250H

13.2.4. Modification History ARCHIVE SC499

SI-NR	SUBJECT
P3000-073	Using an Archive tape streamer in P3102 systems

13.2.5. Installation / Maintenance ARCHIVE SC499

The tape controller may be installed in any of the expansion slots. Ensure that there is no conflict in I/O addresses, interrupt requests and DMA channels used. After installation of controller and drive the program FTINSTAL.COM must be run. Enter base I/O address, DMA channel and interrupt request as strapped on the controller.

### 13.2.6. Diagnostic Functions ARCHIVE SC499

After power on or reset the controller performs a self test if strap KK is installed. The LEDs on the controller (DS1..DS5) are on during the test. If no errors are found, the five LEDs on the controller are switched off.

If an error occurs, it is reported by continuous flashing of the appropriate LED as detailed below.

Fault Codes:-

1. DS1 flashing - fault in LSI controller.
2. DS2 flashing - fault in 16 Kbyte RAM.
3. DS3 flashing - fault in data separator logic.
4. DS4 (not used to indicate diagnostic error).
5. DS5 (not used to indicate diagnostic error).



### 13.3. ARCHIVE SC499R

#### 13.3.1. Characteristics ARCHIVE SC499R

The Archive SC499R tape controller is a cost reduced version of the Archive SC499 tape controller. The SC499R Tape Controller interfaces the ARCHIVE 5945C  $\frac{1}{4}$ -inch cartridge tape drive.

#### 13.3.2. Connections ARCHIVE SC499R

Tape Drive Connector J2

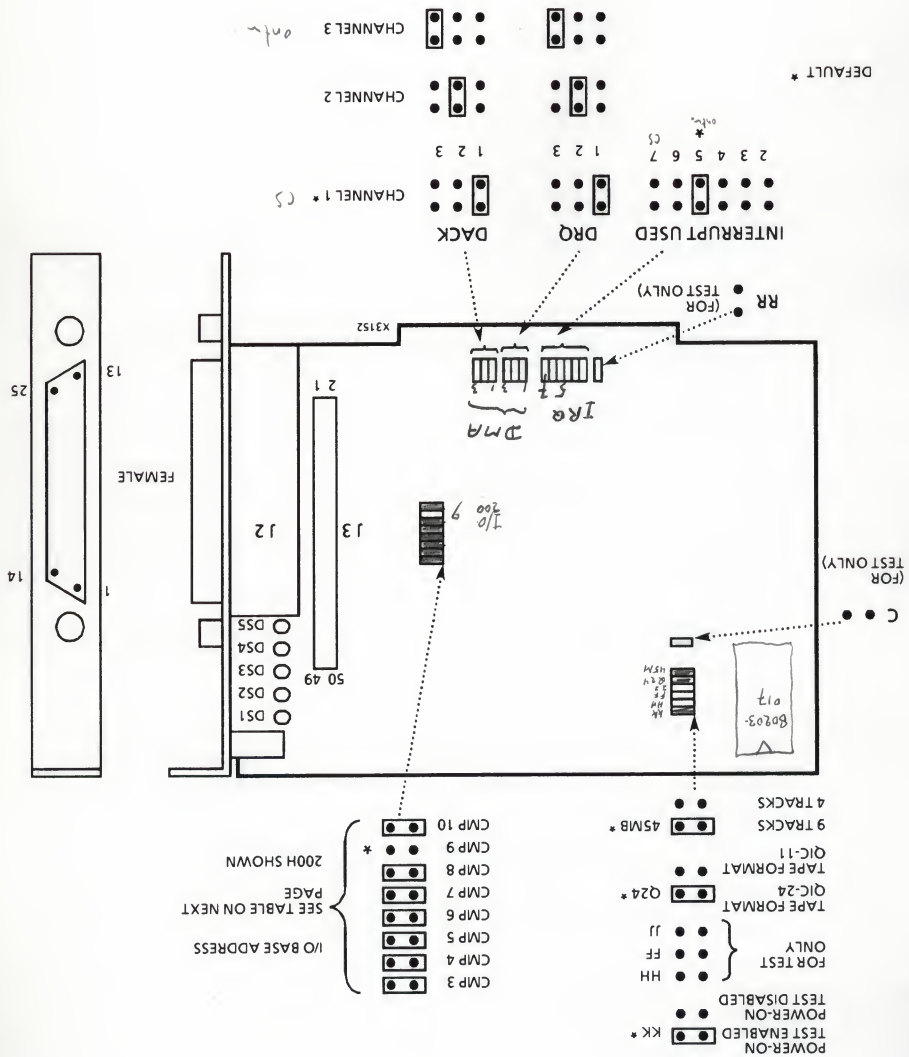
PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	EEN-N	14	WEN-N
2	HSD-N	15	GND
3	GND	16	WDA+
4	GND	17	WDA-N
5	TCH-N	18	USF-N
6	CIN-N	19	GND
7	LTH-N	20	UTH-N
8	GND	21	RDP-N
9	HC-N	22	DSO-N
10	RST-N	23	TR0-N
11	TR1-N	24	TR2-N
12	TR3-N	25	REV-N
13	GO-N		



# Tape Drive Connector J3

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
01	02	GO-N
03	04	REV-N
05	06	TR3-N
07	08	TR2-N
09	10	TR1-N
11	12	TR0-N
13	14	RST-N
15	16	Reserved
17	18	Reserved
19	20	Reserved
21	22	DSO-N
23	24	HC-N
25	26	RDP-N
27	28	UTH-N
29	30	LTH-N
31	32	Reserved
33	34	CIN-N
35	36	USF-N
37	38	TCH-N
39	40	WDA-N
41	42	WDA +
43	44	Reserved
45	46	HSD-N
47	48	WEN-N
49	50	EEN-N

# 13.3.3. Strap Settings / Adjustments ARCHIVE SC499R





### 13.3.6. Diagnostic Functions ARCHIVE SC499R

After power on or reset the controller performs a self test if strap KK is installed. The LEDs on the controller (DS1..DS5) are on during the test. If no errors are found, the five LEDs on the controller are switched off.

If an error occurs, it is reported by continuous flashing of the appropriate LED as detailed below.

Fault Codes:-

1. DS1 flashing - fault in LSI controller.
2. DS2 flashing - fault in 16 Kbyte RAM.
3. DS3 flashing - fault in data separator logic.
4. DS4 flashing - fault in 8155 PIA
5. DS5 (not used to indicate diagnostic error).





### 13.4. ARCHIVE SC402

#### 13.4.1. Characteristics ARCHIVE SC402

The SC402 Tape Controller interfaces the VIPER 2150L  $\frac{1}{4}$ -inch cartridge tape drive.

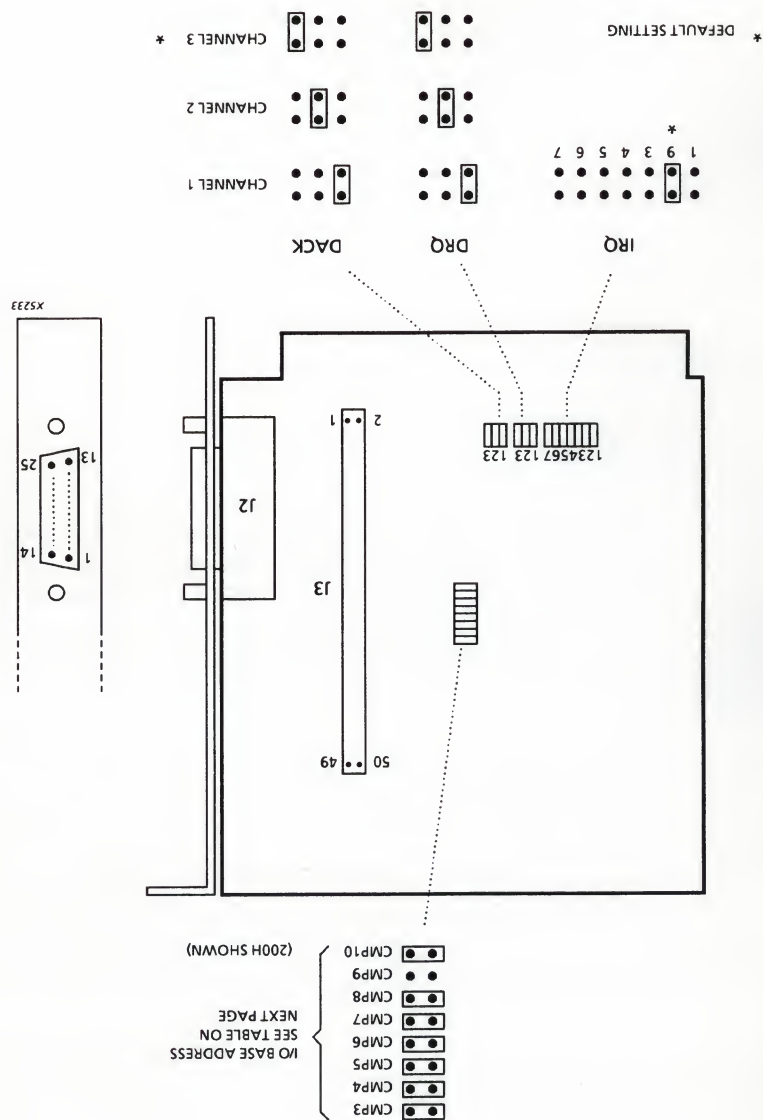
#### 13.4.2. Connections ARCHIVE SC402

Tape Drive Connector J2

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	EEN-N	14	WEN-N
2	HSD-N	15	GND
3	GND	16	WDA +
4	GND	17	WDA-N
5	TCH-N	18	USF-N
6	CIN-N	19	GND
7	LTH-N	20	UTH-N
8	GND	21	RDP-N
9	HC-N	22	DSO-N
10	RST-N	23	TR0-N
11	TR1-N	24	TR2-N
12	TR3-N	25	REV-N
13	GO-N		

# Tape Drive Connector J3

GROUND RETURN	SIGNAL PIN	SIGNAL NAME
01	02	GO-N
03	04	REV-N
05	06	TR3-N
07	08	TR2-N
09	10	TR1-N
11	12	TR0-N
13	14	RST-N
15	16	Reserved
17	18	Reserved
19	20	Reserved
21	22	DSO-N
23	24	HC-N
25	26	RDP-N
27	28	UTH-N
29	30	LTH-N
31	32	Reserved
33	34	CIN-N
35	36	USF-N
37	38	TCH-N
39	40	WDA-N
41	42	WDA +
43	44	Reserved
45	46	HSD-N
47	48	WEN-N
49	50	EEN-N





# I/O Base Address Selection

The base I/O address is strap selectable. The base I/O address range can be from 000H-007H up to 7F8H-7FFH (all ranges are on 8-byte boundaries). Straps CMP3 through CMP10 are representing a part of the binary base I/O address. A strap installed corresponds with a logical '0', and a strap removed corresponds with a logical '1'. The table below gives two examples.

CMP 10	CMP 9	CMP 8	CMP 7	CMP 6	CMP 5	CMP 4	CMP 3	BASE I/O ADDRESS
IN	OUT	IN	IN	IN	IN	IN	IN	
'0'	'1'	'0'	'0'	'0'	'0'	'0'	'0'	200H*
OUT	OUT	IN	OUT	OUT	IN	OUT	OUT	
'1'	'1'	'0'	'1'	'1'	'0'	'1'	'1'	6D8H

\* = Default

## 13.4.5. Installation / Maintenance ARCHIVE SC402

The tape controller may be installed in any of the expansion slots. Ensure that there is no conflict in I/O addresses, interrupt requests and DMA channels used. Connection of an external drive is possible on connector J2, an internal drive uses J3. Only one drive (internal or external) may be installed.

## Set the adapter card jumpers

1. Remove the adapter card from its protective packaging.
2. The VP402 Adapter Card has two jumper blocks that determine the base I/O port address, interrupt priority, and direct memory access (DMA) levels. Interrupt and DMA levels determine the priority for microprocessor service to peripherals.

The VP-402 is shipped with jumpers set for standard AT configurations.

If you have reconfigured your system or have a system other than a standard AT, you may have to change jumper settings to agree with your particular computer configuration. Figure 8 depicts possible settings for both the Interrupt and DMA level jumper block and the base I/O port address jumper block. Refer to Figure 9 and your computer owner's manual to determine jumper settings for your system.

## Install the I/O cable

Two cables are included in your kit - a wide ribbon I/O cable and a power cable.

For IBM AT installation, only the ribbon cable will be used.

**CAUTION:** The I/O cable must be installed as shown in Figure 10 to maintain proper polarity.

1. Plug one end of the ribbon cable into J3 on the Adapter Card.

VP 402  
SC 7  
Viper

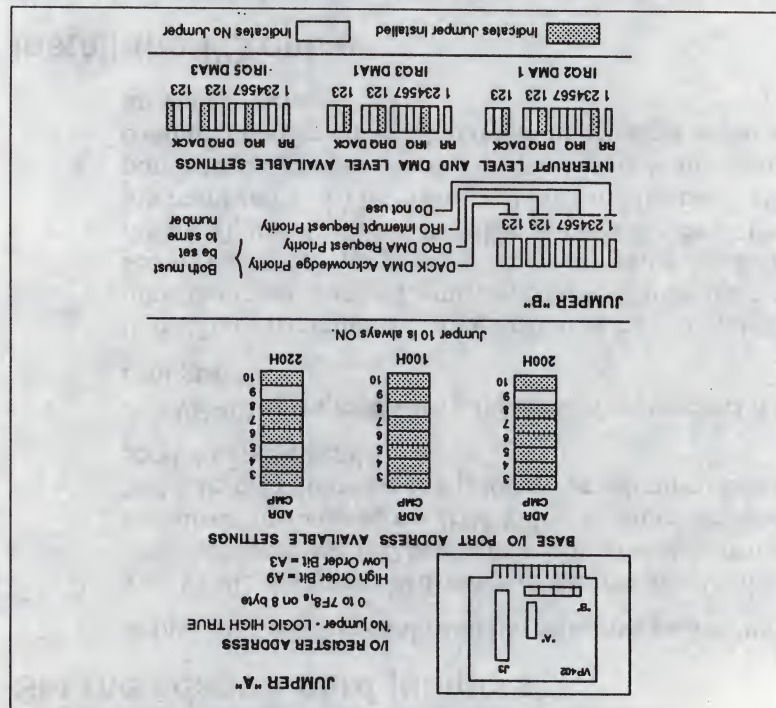
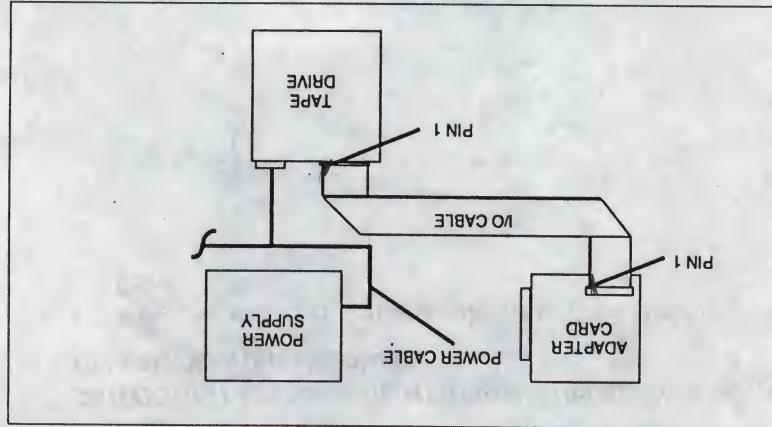


Figure 9. Adapter card jumper block and jumper configuration tables





## 15. DC/LAN CONTROL UNITS

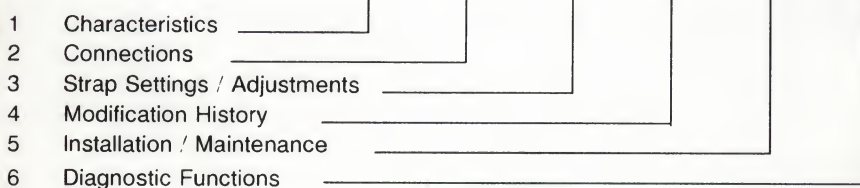
Section:

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1.2: V.24 Reference Data	15.1-2
1.3: X.24 Reference Data	15.1-3
1.4: MS-DOS LPT / COM Port Assignments	15.1-4
1.5: Technical Data	15.1-5

2: CXI 3278 3279 PC-COAX Ver. 1A	15.2-1	15.2-1	15.2-2	n.a	15.2-3	15.2-3
3: CXI 3278/3279 PC COAX Ver. 1B	15.3-1	15.3-1	15.3-2	n.a	15.3-3	15.3-3
4: 1S/1P I/O Board	15.4-1	15.4-1	15.4-2	15.4-4	15.4-5	n.a.
5: ILP Board	15.5-1	15.5-2	15.5-3	15.5-4	15.5-4	15.5-5
6: IDEA MINICOM Board	15.6-1	15.6-1	15.6-2	15.6-3	15.6-3	15.6-3
7: LWSI-Controller	15.7-1	15.7-1	15.7-2	15.7-10	15.7-12	15.7-14
8: SPB-A Serial / Parallel Board	15.8-1	15.8-2	15.8-4	n.a	15.8-5	n.a
9: ICP Board	15.9-1	15.9-2	15.9-5	15.9-7	15.9-8	15.9-9
10: AST Four Port	15.10-1	15.10-1	15.10-3	n.a	15.10-4	15.10-5
11: NP500 LAN Controller	15.11-1	15.11-2	15.11-3	15.11-5	15.11-6	15.11-8
12: NI5210 LAN Controller	15.12-1	15.12-2	15.12-3	15.12-6	15.12-6	15.12-8

Subsection:



**NOTE:** n.a. means that this section is not available for this unit.



13: PERSYST Multifunction Board <i>EMULEX</i>	15.13-1	15.13-1	15.13-3	n.a.	15.13-5	n.a.
14: PCOX/COAX	15.14-1	15.14-1	15.14-2	n.a.	15.14-3	15.14-3
15: Specialix Host Card I/O Controller	15.15-1	15.15-2	15.15-4	n.a.	15.15-5	n.a.
16: NP600 LAN Controller	15.16-1	15.16-2	15.16-3	n.a.	15.16-6	15.16-8
17: Network Processor (IVA)	15.17-1	15.17-2	15.17-6	15.17-16	15.17-18	15.17-18
18: 3C501 LAN Controller	15.18-1	15.18-2	15.18-3	n.a.	15.18-5	15.18-6
19: NE1000A LAN Controller	15.19-1	15.19-2	15.19-3	n.a.	15.19-4	n.a.
20: NE2000 LAN Controller	15.20-1	15.20-2	15.20-3	15.20-4	15.20-5	n.a.
21: Eiconcard/PC	15.21-1	15.21-2	15.21-3	n.a.	15.21-4	15.21-4
22: Enhanced LAN Processor ELP/eisa (IVB)	15.22-1	15.22-2	15.22-3	n.a.	15.22-4	15.22-4
23: Tokencard Tokencard WS	15.23-1	15.23-1	15.23-2	n.a.	15.23-3	15.23-3
24: NI6510 Interlan Contr.	15.24-1	15.24-1	15.24-2	n.a.	15.24-3	15.24-3

## Subsection:

- 1 Characteristics \_\_\_\_\_
  - 2 Connections \_\_\_\_\_
  - 3 Strap Settings / Adjustments \_\_\_\_\_
  - 4 Modification History \_\_\_\_\_
  - 5 Installation / Maintenance \_\_\_\_\_
  - 6 Diagnostic Functions \_\_\_\_\_
- 

**NOTE:** *n.a.* means that this section is not available for this unit.

## 15.1. TECHNICAL OVERVIEW

### 15.1.1. Option Cross Reference Guide

OPTION	P 2 1 2 0	P 2 2 3 0	A V E N G	P31xx					P32xx					P33xx							P 3 4 6 4	P 3 4 0 0	P91xx								
				0	0	0	0	2	0	0	0	0	3	3	0	0	4	4	5	6			6	7	3	3	6	6	7		
				1	2	5	I	II	I	II	I	II	I	II	I	II	I	II	I	II			I	II	0	5	0	5	0		
2: CXI 3278/3279 PC-COAX Ver. 1A	x	x		x	x			x					x																		
3: CXI 3278/3279 PC-COAX Ver. 1B					x												x														
4: 1S/1P I/O Board				x	x	x	x		x	x	x	x			x	x			x					x							
5: ILP Board	x	x		x	x	x	x	x	x	x	x	x			x	x							x								
6: IDEA MINICOM Board				x	x	x	x		x	x	x	x			x	x			x				x								
7: LWSI-Controller	x	x		x	x	x	x	x	x	x	x	x	x		x	x							x								
8: SPB-A Serial / Parallel Board																x															
9: ICP Board											x					x							x			x	x	x	x		
10: AST Four Port												x								x					x						
11: NP500 LAN Controller			x														x		x	x	x		x			x	x	x	x		
12: NI5210 LAN Controller	x	x						x			x	x	x				x		x				x			x	x	x	x	x	
13: Persyst Multifunction				x	x	x	x		x	x	x	x			x	x															
14: PCOX/COAX				x	x	x	x		x	x	x	x			x	x			x				x								
15: Specialix Host Card I/O Controller																							x				x	x	x	x	x
16: NP600 LAN Controller											x					x			x												
17: Network Processor (IVA)																											x	x	x	x	x
18: 3C501 LAN Controller																															
19: NE1000A LAN Controller																															
20: NE2000 LAN Controller																															
21: Eiconcard/PC															x	x		x	x		x	x		x							
22: Enhanced LAN Processor ELP/eisa (IVB)																														x	
23: WD Tokencard Tokencard WS	x							x	x			x	x		x		x	x	x	x	x	x	x	x			x	x	x	x	
24: NI6510 InterLan Controller																x		x	x	x	x	x	x	x			x	x	x	x	

## 15.1.2. V.24 Reference Data

Data Communications Interface CCITT V.24 / EIA RS232C

DEC Control	PIN ASSIGNM'T		SIGNAL NAMES					DIRECTION (TO/FROM DTE)	DESCRIPTION  DTE = TERMINAL DCE = MODEM
	25P	37P	CCITT V.24	EIA RS232	EIA RS449	DIN 66020	Lit. Francaise		
	1	1		AA	-	E1	TP	to from	Protective Ground Shield
	7	19	102	AB	SG	E2	TS	to from	Signal Ground Common Return
GND	5								
TXD	3	4	103	BA	SD	D1	ED	from	Transmitted Data
RXD	2	6	104	BB	RD	D2	RD	to	Received Data
R+5	7	7	105	CA	RS	S2	DPE	from	Request to Send
CTS	8	9	106	CB	CS	M2	PAE	to	Ready for Sending
DSR	6	11	107	CC	DM	M1	PDP	to	Data Set Ready
DTX	4	-	108 1	-	-	S1.1	CPD	from	Connect Data Set to Line
RI	9	12	108 2	CD	TR	S1.2	TDP	from	Data Terminal Ready
DCD	1	15	125	CE	IC	M3	IA	to	Calling Indicator
	8	13	109	CF	RR	M5	DP	to	Received Line Signal Detector (Data Carrier Detector)
	21	33	110	CG	SQ	M6	QSR	to	Signal Quality Detector
	23	16	111	CH	SR	S4	SDB	from	Data Signal Rate Selector (DTE)
	23	2	112	CI	SI	M4	SDB	to	Data Signal Rate Selector (DCE)
	11	16	126	-	SF	S5	SFE	from	Select Transmit Frequency
	24	17	113	DA	TT	T1	HEE BTE	from	Transmitter Signal Element Timing (Clock from DTE)
	15	5	114	DB	ST	T2	HE (I)	to	Transmitter Signal Element Timing (Clock from DCE)
	17	8	115	DD	RT	T4	HR	to	Receiver Signal Element Timing
	14	3*	118	SBA	SSD	HD1	EDS	from	Secondary Transmitted Data
	16	4*	119	SBB	SRD	HD2	RDS	to	Secondary Received Data
	19	7*	120	SCA	SRS	HS2	DPES	from	Secondary Request To Send
	13	8*	121	SCB	SCS	HM2	PAES	to	Secondary Clear To Send
	12	2*	122	SCF	SRR	HM5	DPS	to	Secondary Carrier Detector
	9/10	3/21							Reserved for Data Set Testing
	11/18	-							Un-assigned
	25								
	21	14	140		RL			from	Loop Back Maintenance Test
	18	10	141		LL			from	Local Loop Back
	25	18	142		TM			to	Test Indicator



### 15.1.3. X.24 Reference Data

Data Communications Interface CCITT X.24

CCITT X24	PIN 15P	DIRECTION (TO/FROM DTE)	DESCRIPTION DTE = TERMINAL DCE = MODEM
	1	to/from	Shield
G	8	to/from	Signal Ground/Common Return
Ga		from	DTE Common Return
Gb		to	DCE Common Return
T(A)	2	from	Transmit Data
T(B)	9	from	Transmit Data
R(A)	4	to	Receive Data
R(B)	11	to	Receive Data
C(A)	3	from	Control
C(B)	10	from	Control
I(A)	5	to	Indication
I(B)	12	to	Indication
S(A)	6	to	Signal Element Timing
S(B)	13	to	Signal Element Timing
B(A)	7	to	Byte Timing
B(B)	14	to	Byte Timing
	15		Reserved



#### 15.1.4. MS-DOS LPT / COM Port Assignments

##### LPT Port Assignments

LPT1 is always assigned to the highest I/O address (when using one parallel port, this may be on 278H, 378H or 3BCH). If two parallel ports are installed, LPT2 is assigned to the next lower I/O address. If three parallel ports are installed, LPT3 is assigned to the lowest I/O address. The following table gives the seven possible configurations.

	BASE ADDRESS	PORT	BASE ADDRESS	PORT	BASE ADDRESS	PORT
1	-		-		278H	LPT1
2	-		378H	LPT1	-	
3	-		378H	LPT1	278H	LPT2
4	3BCH	LPT1	-		-	
5	3BCH	LPT1	-		278H	LPT2
6	3BCH	LPT1	378H	LPT2	-	
7	3BCH	LPT1	378H	LPT2	278H	LPT3

LPT Assignments

##### COM Port Assignments

COM1 is always assigned to the highest I/O address (when using only one port, this may be either on 2F8H or 3F8H). If two serial ports are installed COM2 is assigned to the next lower I/O address (COM1 is assigned to 3F8H and COM2 is assigned to 2F8H). The following table gives the three possible configurations.

BASE ADDRESS	PORT	BASE ADDRESS	PORT
-		2F8H	COM1
3F8H	COM1	-	-
3F8H	COM1	2F8H	COM2

Serial Port Assignments

### 15.1.5. Technical Data

SPECIFICATION	CXI 3278/3279 Ver. 1A / 1B	1S/1P I/O BOARD	ILP BOARD	IDEA MINICOMM BOARD	LWSI Contr.
<b>Parallel Port</b>	n.a.				
Interrupts		IRQ7 (PRN1) IRQ5 (PRN2)	n.a.	n.a.	n.a.
I/O Addresses		378-37F or 278-27F			
Type		Centronics			
Levels		TTL			
Physical		D25-female			
<b>Serial Port</b>					
Interrupts		IRQ4 (COM1) IRQ3 (COM2)	IRQ2 or IRQ3	IRQ2 or IRQ7	IRQ2 or IRQ3/5/7
I/O Addresses	2EE-2FF or 3EE-3FF, 220-227	3F8-3FF or 2F8-2FF	364-367	380-383 or 390-393	
DMA Channels	DRQ1 or DRQ3, none			DRQ1 or DRQ3	
Type	IBM type A	subset V24	Sopho-LAN-S	V24	LWSI or X24 or V24
Levels		V28	V11 (RS-422)	V28	X27 or V28
Physical	RG62-93OHm	D9-male	D9-female	D25-female	D25-female
Data Rate (bits/s)	2.35M	50-19,200	1 or 2Mb	19.2k	96k LWSI 19.2k RWSI
<b>Microprocessor</b>	gate array	n.a.	80188		8088
RAM(kbytes)		n.a.	64		8
ROM(kbytes)		n.a.	64 + 8		16
<b>Power Consumption</b>					
+5 VDC (A)	1.0	0.7	2.0		1.75
+12 VDC (ma)		22.0	150.0		50.0
-12 VDC (ma)		20.0	150.0		50.0
<b>Dimensions</b>					
Length (mm)	127	127	338	129	338
Width (mm)	102	102	106	106	106
Weight (kg)					

SPECIFICATION	ICP BOARD
<b>Parallel Port</b>	n.a.
Interrupts	
I/O Addresses	
Type Levels Physical	
<b>Serial Port</b>	IRQ2 or IRQ3  350H or 354H or 358H or 35CH  DMA Channels  Type Channel A X21 / V.24 Channel B V.24  Levels Physical  Data Rate (bits/s) Channel A up to 100Kb Channel B up to 19.2Kb
Interrupts	
I/O Addresses	
DMA Channels	
Type	
Levels	
Physical	
Data Rate (bits/s)	
<b>Microprocessor</b>	80186
RAM(kbytes)	512
ROM(kbytes)	64 + 8
<b>Power Consumption</b>	
+5 VDC (A)	
+12 VDC (ma)	
-12 VDC (ma)	
<b>Dimensions</b>	
Length (mm)	
Width (mm)	
Weight (kg)	

SPECIFICATION	AST FOUR PORT
<b>Serial Port</b>	IRQ 2, 3, 4, 5, 6, 7 shared  IRQ4 IRQ3 IRQ 2, 3, 4, 5, 6, 7 shared
Interrupts	
Enhanced mode Channel 1, 2, 3,4	
Compatible mode Channel 1 Channel 2 Channel 3, 4	
I/O Addresses	2A0-2A7H or 1A0-1A7H  2A8-2AFH or 1A8-1AFH  1B0-1B7H or 2B0-2B7H  1B8-1BEH or 2B8-2BEH  3F8-3FFH 2F8-2FFH  1B0-1B7H or 2B0-2B7H  1B8-1BEH or 2B8-2BEH
Enhanced mode	
channel 1	
channel 2	
channel 3	
channel 4	
Compatible mode	
channel 1	
channel 2	
channel 3	
channel 4	
Type	Subset V24
levels	V28
Physical	D37-male
Data Rate (bits/s)	50-19.2k



SPECIFICATION	NP500 LAN Controller	NP600 LAN Controller	NI5210 LAN Controller
<b>Standard Ethernet IEEE 802.3 10BASE5</b>			
Compatibility	Ethernet V1.0 IEEE 802.3	Ethernet V1.0 IEEE 802.3	Ethernet V1.0 IEEE 802.3
Data transmission Rate	10 Mbps	10 Mbps	10 Mbps
Transceiver Interface Specifications			
Compatibility	Ethernet V1.0 and V2.0 IEEE802.3	Ethernet V1.0 and V2.0 IEEE802.3	Ethernet V1.0 and V2.0 IEEE802.3
Connectors	15-pin female	15-pin female	15-pin female
<b>Thin Ethernet IEEE 802.3 10BASE2</b>			
Data transmission Rate	10 Mbps	10 Mbps	10 Mbps
Thin Ethernet Interface Specifications			
Connector	Male BNC T-connector 50 ohm	Male BNC T-connector 50 ohm	Male BNC T-connector 50 ohm
Interrupts	IRQ 3,5,9,11,15	IRQ 3,5,9,11,15	IRQ2.3,4,5,6,7
I/O Addresses	200-3FFH 16 byte increments	200-3FFH 8 byte increments	200-3FFH 8 byte increments
DMA Channels	DRQ 1,3,5,7	DRQ 1,3,5,7	
<b>Microprocessor</b>			
RAM(kbytes)	80186 512	80186 512	n.a. 8Kb Optional 8Kb
ROM(kbytes)	Optional 8 Kb	16 Kb Optional 32 Kb or 64 Kb	Optional 8Kb
<b>Power Consumption</b>			
+ 5 VDC (A)	1.4	3.0	1.4
+ 12 VDC (mA)	500	500	500
-12 VDC (mA)			
Operating Temperature	0-70 °C	0-50 °C	0-50 °C
Relative humidity	90 % (max) non-condensing	90 % (max) non-condensing	5..90 % non-condensing
<b>Dimensions</b>			
Length (mm)	338	338	129
Width (mm)	106	122	106
Weight (kg)			
Connector	Male BNC T-connector 50 ohm	Male BNC T-connector 50 ohm	Male BNC T-connector 50 ohm



SPECIFICATION	PERSYST MULTIFUNCTION
<b>Parallel Port</b>	
Interrupts	IRQ7 or IRQ5
I/O Addresses	378-37F or 278-27F
Type	Centronics or Dataproducts  Bi-directional or uni-directional  Internally or externally controlled
Levels	TTL
Physical	D25-female
<b>Serial Port</b>	
Interrupts	IRQ5, 4, 3 or 2
I/O Addresses	3F8-3FF or 2F8-2FF
Type	RS232 or TTL
Levels	V28 or TTL
Physical	D9-male
Data Rate (bits/s)	50-9.600
<b>Calendar Clock</b>	
I/O Addresses	250-350
<b>RAM</b>	
Size	64 to 704 Kbytes
<b>Power Consumption</b>	
+ 5 VDC (A)	1.0
+ 12 VDC (mA)	250.0
-12 VDC (mA)	250.0
<b>Dimensions</b>	
Length (mm)	
Width (mm)	
Weight (kg)	

SPECIFICATION	PCOX COAX
I/O Addresses	220-22F or 620-62F or A20-A2F or E20-E2F
DMA Channels	DRQ1 or DRQ3, none
Type	IBM type A
Physical	RG62-93OHm
Data Rate (bits/s)	2.35M
Microprocessor	Gate Array

SPECIFICATION	SPECIALIX Host Card 1
RAM	32 or 64 Kbytes
RAM Addresses	D0000-DFFFF or DE0000-DEFFFF
Interrupts	IRQ 11, 12 or 15
Interface Type	SI high bandwidth TTL bus, providing RS232 ports via adapter box
Data Rate (bits/s)	500
Microprocessor	Zilog Z280
Clock Frequency	20 MHz

SPECIFICATION	SPECIALIX Host Card 2
RAM	32 or 64 Kbytes
RAM Addresses	Any 32 K boundary within the address space.
Interrupts	IRQ 11, 12 or 15
Interface Type	SI high bandwidth TTL bus, providing RS232 ports via adapter box
Data Rate (bits/s)	500
Microprocessor	Zilog Z280
Clock Frequency	20 MHz

SPECIFICATION	Network Processor (IVA)	Enhanced LAN Processor (IVB)
<b>System IO Bus</b>		
Interface	AT-bus (ISA)	EISA
Interrupts	IRQ7, 11, 12, 14 or 15	IRQ7, 9, 10, 11 or 14 (selected by software)
I/O addresses	0240 <sub>h</sub> or 0250 <sub>h</sub> (default) - IVA supports any I/O address from 0000 <sub>h</sub> -03F0 <sub>h</sub> on 16-bit increments	EISA IO address SC8D <sub>h</sub> in which S is the slot number.
DMA channels	DRQ5, 6 or 7	IVB is a DMA controller
<b>DC Connectors</b>		
Channel A (26-pin D-type)	LWSI, V.24, V35 or X.21	-
Channel B (26-pin D-type)	V.24, V35 or X.21	-
BNC coax	-	ISO 8802/3 DAD1 (10BASE2)
AUI	-	ISO 8802.3 (10BASE5)
<b>RAM</b>		
DRAM	1 Mbyte	1 Mbyte
SRAM	-	128Kbyte
<b>EPROM</b>		
Firmware	128 Kbytes	64 Kbytes
<b>Microprocessors</b>		
Operating	68010	68020
Support	68000	Ethernet Co-processor
<b>Diagnostics</b>	Power-on self-test. DTI interface for connector tests and debugging loadmodule. LED indication.	Power-on self-test. DTI interface for debugging loadmodule. LED indication.
<b>Power Consumption</b>		
+ 5 VDC (A)	3.55	3.0
-5 VDC (mA)	200	-
+ 12 VDC (mA)	100	500 (powering external MAU)
-12 VDC (mA)	100	500 (powering external MAU)
<b>Dimensions</b>		
Length (mm)	338	338
Width (mm)	114	114

SPECIFICATION	3C501 LAN Controller	NE1000A LAN Controller	NE2000 LAN Controller
<b>Standard Ethernet IEEE 802.3 10BASE5</b>			
Compatibility	Ethernet V1.0 IEEE 802.3	Ethernet V1.0 IEEE 802.3	Ethernet V1.0 IEEE 802.3
Data transmission Rate	10 Mbps	10 Mbps	10 Mbps
Transceiver Interface Specifications			
Compatibility	Ethernet V1.0 and V2.0 IEEE802.3	Ethernet V1.0 and V2.0 IEEE802.3	Ethernet V1.0 and V2.0 IEEE802.3
Connectors	15-pin female	15-pin female	15-pin female
<b>Thin Ethernet IEEE 802.3 10BASE2</b>			
Data transmission Rate	10 Mbps	10 Mbps	10 Mbps
Thin Ethernet Interface Specifications			
Connector	Male BNC T-connector 50 ohm	Male BNC T-connector 50 ohm	Male BNC T-connector 50 ohm
Interrupts	IRQ2,3,4,5,6,7	IRQ2,3,4,5	IRQ2,3,4,5
I/O Addresses	000-3F0H 16 byte increments	300H, 320H, 340H or 360H	300H, 320H, 340H or 360H
<b>Microprocessor</b>	n.a.	n.a.	n.a.
RAM	2 Kbytes	8 Kbytes	16 Kbytes
ROM	Optional	Optional	Optional
<b>Power Consumption</b>			
+ 5 VDC (A)			
+ 12 VDC (mA)			
-12 VDC (mA)			
<b>Dimensions</b>			
Length (mm)	170	152	199
Width (mm)	107	107	107
Weight (kg)			

SPECIFICATION	EICONCARD/PC
<b>System IO Bus</b>	
Interface	EIA RS232C (V.24 and X.21bis)
Interrupts	IRQ2, 3, 4, 5, 6, 7
Data Transmission Rate	64K bps. (full duplex)
Data Encoding	NR, NRZI, FM
I/O addresses	278, 280, 378, 380, 388, 390, 398, 678, 680, 778, 780, 788, 790, 798
<b>RAM</b>	256 KBytes, 512 KBytes
<b>Microprocessors</b>	
Operating	68008
<b>Diagnostics</b>	On board loopback test (V.54)
<b>Power Consumption</b>	
+5 VDC (A)	1
+12 VDC (mA)	45
-12 VDC (mA)	45





## 15.2. CXI 3278/3279 PC-COAX Ver. 1A

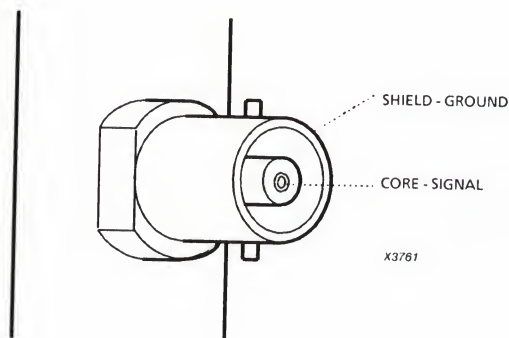
### 15.2.1. Characteristics CXI 3278/3279 PC-COAX Ver. 1A

The CXI 3278/3279 PC-COAX V.1A board and associated software provides all that is required to perform emulation of the IBM 3278/3279 terminals, models 2, 3 and 4. The software included also enables the intelligent transfer of files between the PC and the host. All the associated ASCII/EBCDIC conversion is performed by the CXI firmware.

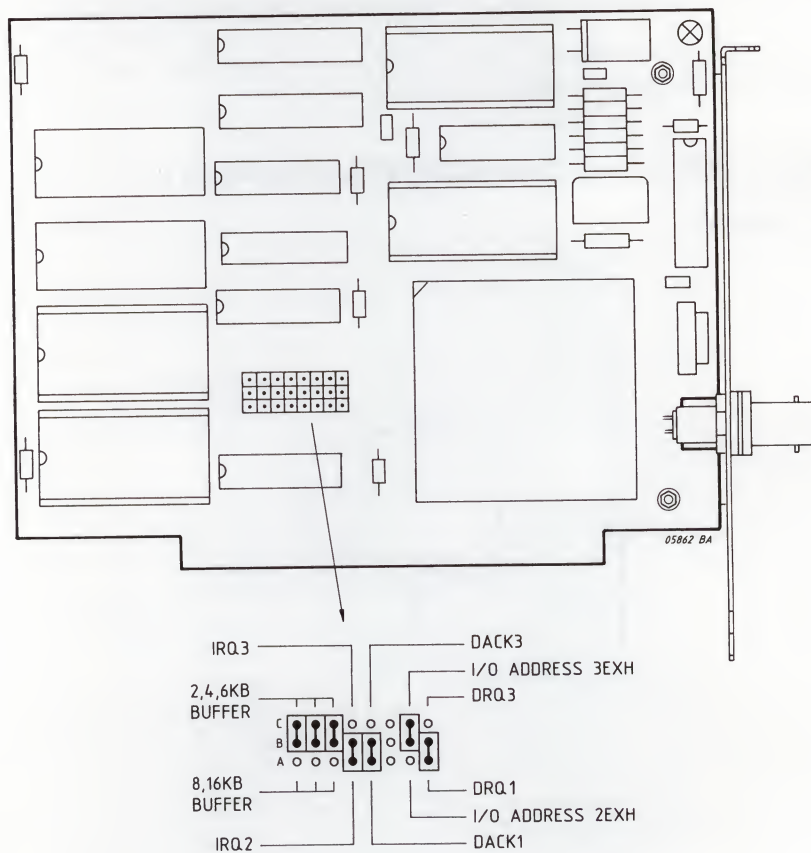
The physical link is provided using a coaxial line to whatever form of 3270 display system controller or mainframe is at the installation.

### 15.2.2. Connections CXI 3278/3279 PC-COAX Ver. 1A

Line Connector



### 15.2.3. Strap Settings / Adjustments CXI 3278/3279 PC-COAX Ver. 1A



### **15.2.5. Installation / Maintenance CXI 3278/3279 PC-COAX Ver. 1A**

This board may be installed in any of the option board slots, on the main board of the system unit. The host connection consists of connecting the RG-62U coaxial cable from the host (not supplied with this board, must be provided by the user) to the connector on the rear plate of the CXI board.

It is important to check that the users DP/MIS department is aware of, and has performed, the software installation as set forth in the CXI documentation. Software installation is required on both the PC and the host system, if all the features of the CXI 3278/3279 PC COAX V.1A board are to function.

### **15.2.6. Diagnostic Functions CXI 3278/3279 PC-COAX Ver. 1A**

The CGDA diagnostic program tests the custom processor and the other functions of the CXI board. The only part of the board it cannot test is the physical line interface (as the communication facility is half-duplex, it is not possible to perform a loopback test).

To initiate the test, type: CGDA <CR> and then: <CR> again, this will start testing. If there is a failure in any of the areas checked, the board is defective.

Should a board that has been reported as defective pass the test program, check the strap settings and ask the user to attempt a connection with the host as he would do normally. Ask him to confirm with the DP/MIS department that the host is "live" and configured for the terminal.





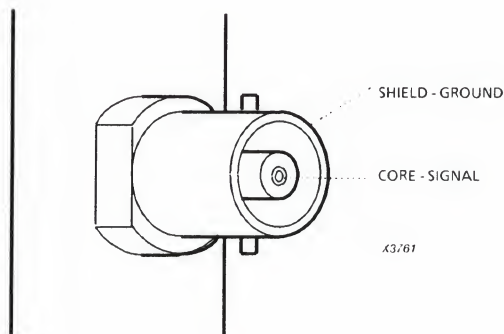
### 15.3. CXI 3278/3279 PC-COAX Ver. 1B

#### 15.3.1. Characteristics CXI 3278/3279 PC-COAX Ver. 1B

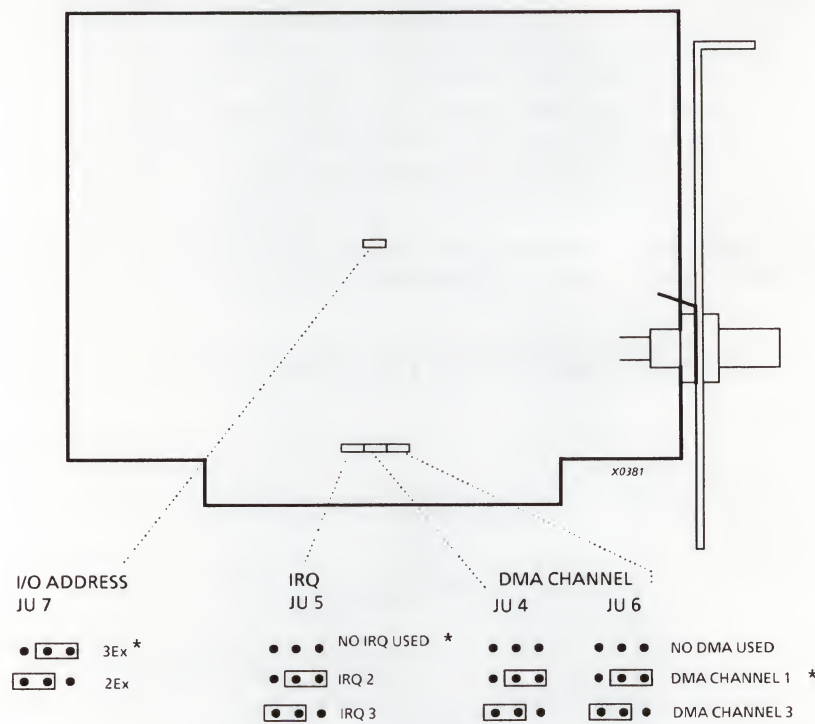
The CXI 3278/3279 PC-COAX Ver. 1B board and associated software provides all that is required to perform emulation of the IBM 3278/3279 terminals, for direct main frame access. The necessary ASCII/EBCDIC conversion is performed by the CXI board. The software included emulates IBM 3278 models 2, 3, 4, or 5 and IBM 3279 models 2A, 3A, 4, or 5. Model 5 is available only for the none windowed control program. When using the windowed control program, a host session a PC session, and up to two notepads are available. The board can operate fully IRMA compatible concurrent with the CXI 3270 application, however when the IRMA application is configured for using extended attributes, no 3278/3279 emulation is possible. The micro codes to support the IBM terminal emulation and the IRMA mode are down loaded to the CXI board when the emulator is started. Different national versions of keyboards can be configured.

#### 15.3.2. Connections CXI 3278/3279 PC-COAX Ver. 1B

Line Connector



### 15.3.3. Strap Settings / Adjustments CXI 3278/3279 PC-COAX Ver. 1B



### **15.3.5. Installation / Maintenance CXI 3278/3279 PC-COAX Ver. 1B**

This board plugs into either a PC or AT I/O slot. The host connection consist of connecting the RG-62U coaxial cable from the host, (not supplied with this board), to the rear plate connector. It is important to check that the users DP/MIS department is aware of, and has performed, the software installation as set forth in the CXI documentation. Software installation is required on both the PC and the host system. When running the menu driven installation program a software selection of I/O addresses and DMA channels can be made, however the on board jumper selections must be the same as the software selected ones to ensure a proper operation. For more detail of the installation program see the CXI manual (delivered with every board).

### **15.3.6. Diagnostic Functions CXI 3278/3279 PC-COAX Ver. 1B**

The CXIDIAG diagnostic program tests the custom processor, the on board memory and the other functions of the board. The only part it cannot test is the physical line interface, (as the communication interface is half- duplex, it is not possible to perform a loopback test).

To initiate the test first install the memory resident terminal emulator, and return to DOS or switch to the PC session and type CXIDIAG <CR>, now a menu appears for the selection of different tests. for more details refer to the CXI manual.





## 15.4. 1S/1P I/O BOARD

### 15.4.1. Characteristics 1S/1P I/O Board

This board contains one RS-232C serial communications port and one parallel printer port. Depending on the number of serial or parallel ports in the system and the used I/O addresses, the serial port can be designated to COM1 or COM2, and the parallel port designated to LPT1, LPT2 or LPT3 (Refer to subsection 15.1.4.). The strapping of this board must not conflict with the settings of the serial and parallel ports present on other boards.

### 15.4.2. Connections 1S/1P I/O Board

Serial Port Connector J2

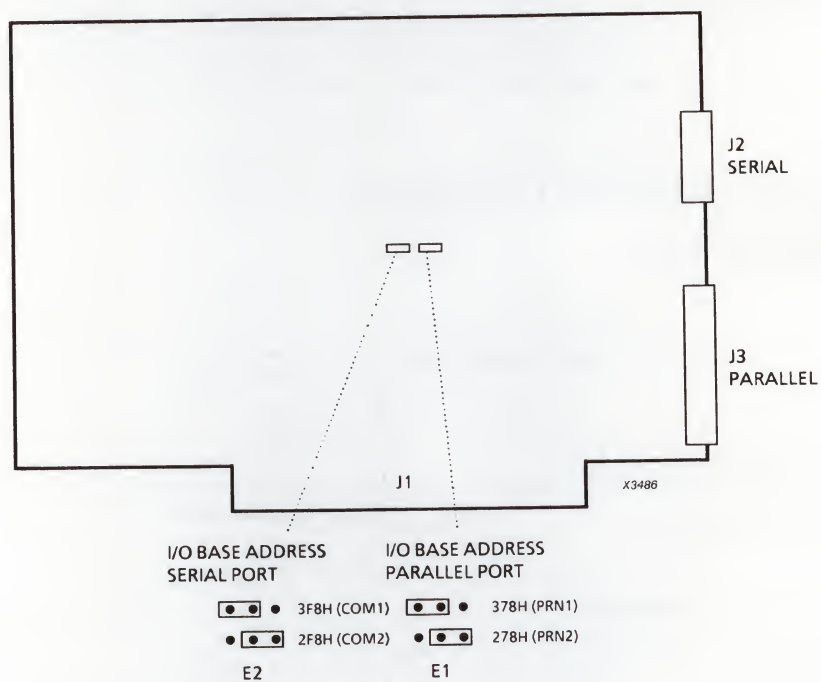
PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	DCD (I)	6	DSR (I)
2	RXD (I)	7	RTS(O)
3	TXD (O)	8	CTS (I)
4	DTR(O)	9	RI (I)
5	GROUND		

Parallel Port Connector J3

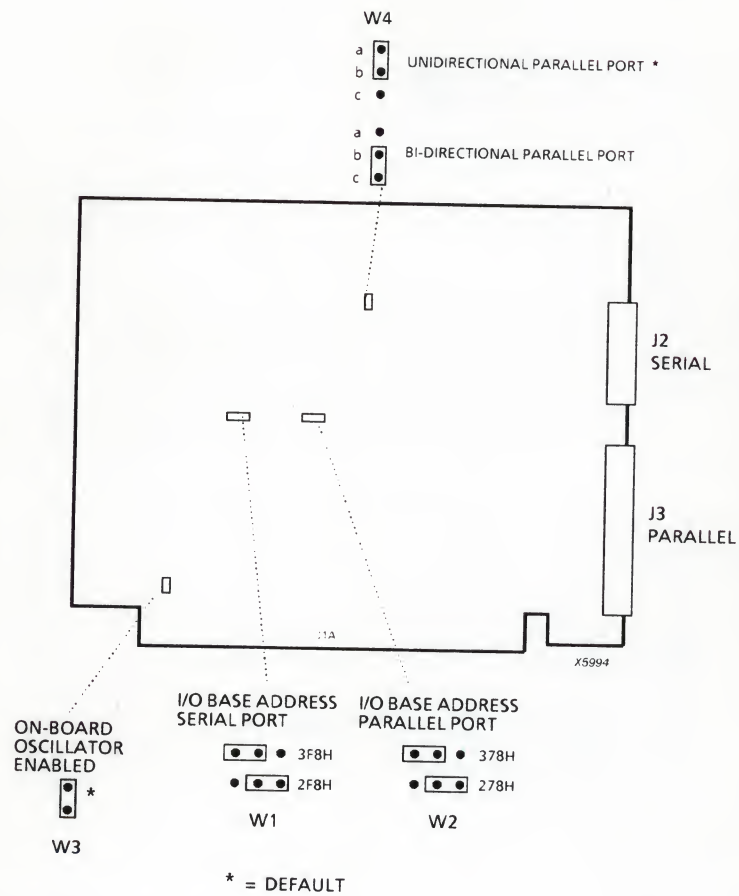
PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	STROBE-N	14	AUTO FEED-N
2	DATA 1	15	ERROR-N
3	DATA 2	16	INIT-N
4	DATA 3	17	SELECT IN-N
5	DATA 4	18	GROUND
6	DATA 5	19	GROUND
7	DATA 6	20	GROUND
8	DATA 7	21	GROUND
9	DATA 8	22	GROUND
10	ACK-N	23	GROUND
11	BUSY	24	GROUND
12	PAPER END	25	GROUND
13	SELECT		

### 15.4.3. Strap Settings / Adjustments 1S/1P I/O Board

Strap Locations 1S/1P I/O Board



# Strap Locations 1S/1P I/O Board (SMD)



**NOTE :** W4 MUST BE IN UNIDIRECTIONAL POSITION TO BE ABLE TO RUN OS/2, XENIX.



#### 15.4.4. Modification History 1S/1P I/O Board

12NC	SUBJECT
13012	Initial Release
13013	Logitec mouse on serial / parallel board (Rev E) (Hardware Modification)
13013	R-C network correction on the 1S1P board
	Problems using parallel interface of 1S 1P under XENIX (Hardware Modification)

The numbers are the last 5 digits of the 12NC number (5107 265 xxxxx).

12NC (SMD)	SUBJECT
16112	Initial Release (2 layer board)
16113	Introduction of SMD version, and modification for XENIX
16413	Capacitors added to comply with FCC "B" regulations
16414	Add 4K7 resistor network to correct impedance on control lines

The numbers are the last 5 digits of the 12NC number (5107 265 xxxxx).

12NC (SMD)	SUBJECT
19411	Initial Release (4 layer board)
19412	Introduction of SMD version, and modification for XENIX
19413	Capacitors added to comply with FCC "B" regulations
19414	Add 4K7 resistor network to correct impedance on control lines
19415	Problem solved with parallel port for XENIX and OS/2
19416	Add strap between AB on W4 strap location
19421	New PCB introduced (replacement of the ACE NS16450V with the ACE NS16550V)

The numbers are the last 5 digits of the 12NC number (5107 265 xxxxx).

#### 15.4.5. Installation / Maintenance 1S/1P I/O Board

The 1S / 1P I/O Board may be installed in any of the option board slots on the main PCB. When installing this board, check other option boards (or main board) with serial or parallel ports. Ensure that there is no duplication of port addresses present within the total system.

The name of the serial or parallel port, as used by MS-DOS, is related to the selected I/O address. Refer to subsection 15.1.4. for names used by MS-DOS.

**P310x:**

When installing this board, check straps W5 and W6 on the main PCB (P3102-4L/2L), the switch settings of SW1-5 and SW1-7 (P3105 / NMS9100).

**P3204:**

When installing this board, check the selections for serial and parallel ports as indicated by the setup program.

**P3302 / P9130 / P9160:**

When installing this board, check strap W21 on the main PCB and the selections for serial and parallel ports as indicated by the setup program.



Henk Koperberg

PHILIPS INFORMATION SYSTEMS  
CORPORATE CENTRE CUSTOMER SUPPORT - TECHNICAL OPERATIONS  
BUILDING R1-b19,

FROM: Charles S. H. le Fèvre, Tel.no.: +31.55.43 2699

Date: October 1, 1991

No. of pages:

kopij PHCC

Onderwerp: GEOS (/ XENIX) op P3202 met 1S/1P pcb

1S/1P pcb is beschikbaar in 3 versies:

- 1. standaard 5107 265 1301x
- 2. 2 layer SMD 5107 265 1611x
- 3. 4 layer SMD 5107 265 1941x

Modificatie tbv GEOS / XENIX:

voor standaard pcb (vlgs P3000-071):

Controleer of pin 1 van IC U8 aan aarde ligt. Zo niet:

Knip pin 1 door van IC U8 (74LS374) en verbind deze door aan aarde.

NB: op heel oude pcb's, nog gemaakt bij MAD, is de locatie U11 ipv U8.

2. voor 2 layer pcb:

Deze versie is meestal van fabriekswege al gemodificeerd.

Controleer of pin 1 van IC U8 aan aarde ligt. Zo niet:

Verhit pin 1 van IC U8 en buig deze VOORZICHTIG omhoog en verbind deze vervolgens door aan aarde. (pin 1 van de U-link W2 is aarde)

3. voor 4 layer pcb:

Deze versie is van fabriekswege uitgerust met een extra U-link W4.

Met W4 wordt bovengenoemde keuze gemaakt:

- W4 keuze 'AT' voor GEOS en XENIX (pin 1 van IC U8 aan aarde).
- W4 keuze 'XT' voor toepassing in PC-XT computers.

~~niet doen:~~ ↓ ↓

Een andere modificatie die ik ook heb uitgevoerd vlgs. SI P3000-156:  
Print snelheids probleem opheffen.

Bij oudere kaarten wordt de interrupt IRQ5 / IRQ7 door signaal PE gestuurd ipv door ACK.

Kontroleer eerst of de modificatie al is uitgevoerd:

Pin 2 van IC U13 moet aan pin 10 liggen van de parallel poort  
(= 25 pin connector), signaal ACK.

Indien niet aanwezig:

\* 1. voor standaard pcb:

Onderbreek het spoor tussen pin 2 van IC U13 en pin 5 van IC U11.

Verbind nu pin 2 van U13 door met pin 10 van de parallel poort

(= 25 pin connector).

2. voor 2 layer pcb:

Deze versie is mogelijk van fabriekswege al gemodificeerd. Zo niet:

Verhit pin 2 van IC U13 en buig deze VOORZICHTIG omhoog en verbind

deze vervolgens door aan pin 10 van de parallel poort

(= 25 pin connector).

NB: werk met goed fijn gereedschap om pin 2 van IC U13 los te maken en niet te beschadigen !! (bv een scalpelmesje).

3. voor 4 layer pcb:

Indien de modificatie al is aangebracht is het level 5107 265 19415.

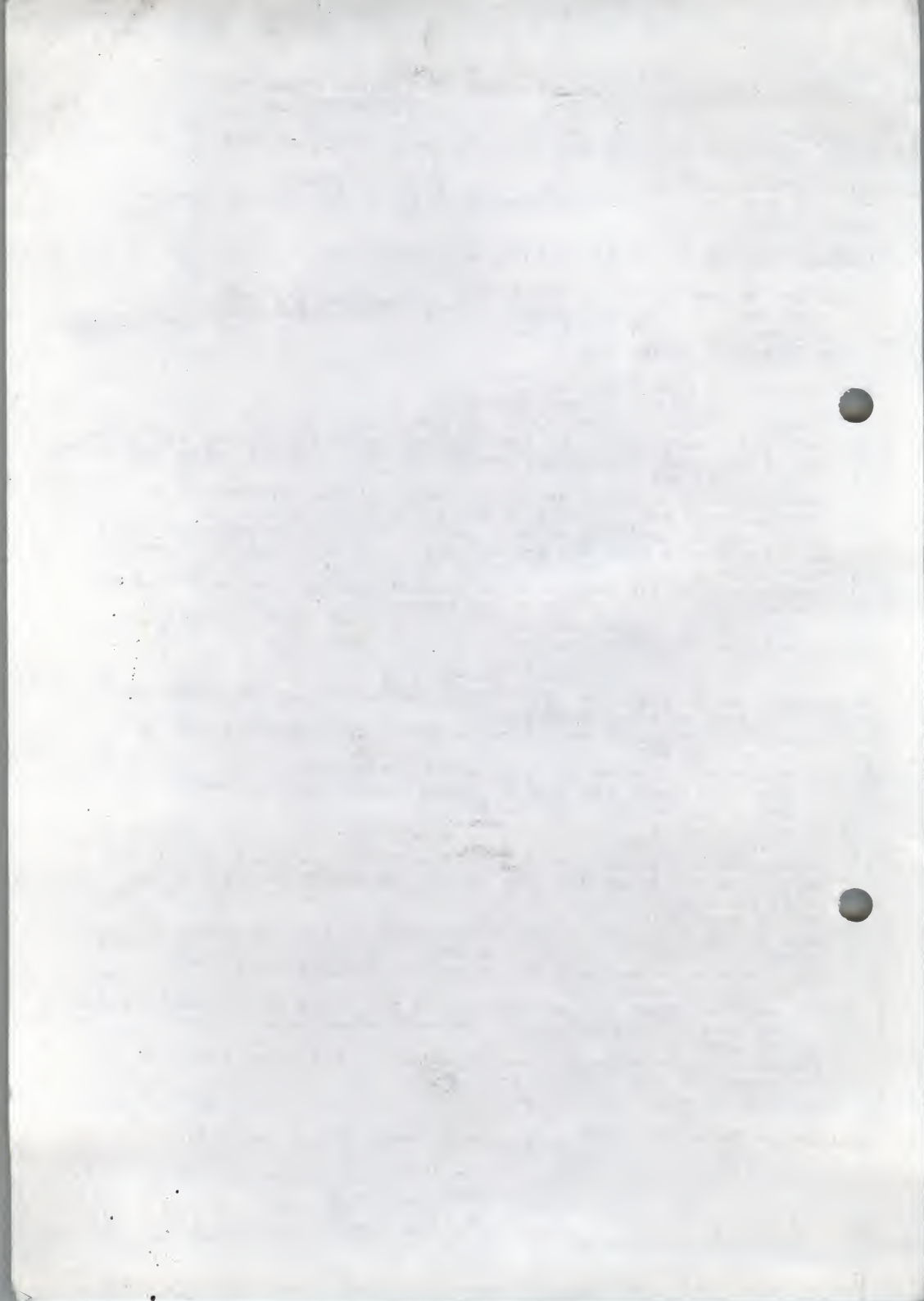
Zie procedure van "2 layer pcb".

Zie beschrijving "2 layer pcb".

Charles le Fèvre; tst 2699.

geen spoor tussen U13.2 en U11.5!  
\*) indien nu U13.2 wordt verbonden met pin 10 J.d.  
par. poort, wordt het niet! opcode trap!  
dus: verbinding weer weggehaald X 4-12-91





11euk Koning.

PHILIPS INFORMATION SYSTEMS  
CORPORATE CENTRE CUSTOMER SUPPORT - TECHNICAL OPERATIONS  
BUILDING R1-b19,

FROM: Charles S. H. le Fèvre,

Tel.no.: +31.55.43 2699

Date: October 1, 1991

No. of pages:

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Onderwerp: GEOS (/ XENIX) op P3202 met 1S/1P pcb

1S/1P pcb is beschikbaar in 3 versies:

1. standaard 5107 265 1301x
2. 2 layer SMD 5107 265 1611x
3. 4 layer SMD 5107 265 1941x

Modificatie tbv GEOS / XENIX:

voor standaard pcb (vlgs P3000-071):

Controleer of pin 1 van IC U8 aan aarde ligt. Zo niet:

Knip pin 1 door van IC U8 (74LS374) en verbind deze door aan aarde.

NB: op heel oude pcb's, nog gemaakt bij MAD, is de locatie U11 ipv U8.

2. voor 2 layer pcb:

Deze versie is meestal van fabriekswege al gemodificeerd.

Controleer of pin 1 van IC U8 aan aarde ligt. Zo niet:

Verhit pin 1 van IC U8 en buig deze VOORZICHTIG omhoog en verbind deze vervolgens door aan aarde. (pin 1 van de U-link W2 is aarde)

3. voor 4 layer pcb:

Deze versie is van fabriekswege uitgerust met een extra U-link W4.

Met W4 wordt bovengenoemde keuze gemaakt:

- W4 keuze "AT" voor GEOS en XENIX (pin 1 van IC U8 aan aarde).

- W4 keuze "XT" voor toepassing in PC-XT computers.

*niet doen: ↓ ↓*

Een andere modificatie die ik ook heb uitgevoerd vlgs. SI P3000-156:

Print snelheids probleem opheffen.

Bij oudere kaarten wordt de interrupt IRQ5 / IRQ7 door signaal PE gestuurd ipv door ACK.

Kontroleer eerst of de modificatie al is uitgevoerd:

Pin 2 van IC U13 moet aan pin 10 liggen van de parallel poort (= 25 pin connector), signaal ACK.

Indien niet aanwezig:

\* 1. voor standaard pcb:

Onderbreek het spoor tussen pin 2 van IC U13 en pin 5 van IC U11.

Verbind nu pin 2 van U13 door met pin 10 van de parallel poort

(= 25 pin connector).

2. voor 2 layer pcb:

Deze versie is mogelijk van fabriekswege al gemodificeerd. Zo niet:

Verhit pin 2 van IC U13 en buig deze VOORZICHTIG omhoog en verbind

deze vervolgens door aan pin 10 van de parallel poort

(= 25 pin connector).

NB: werk met goed fijn gereedschap om pin 2 van IC U13 los te maken en niet te beschadigen !! (bv een scalpelmesje).

3. voor 4 layer pcb:

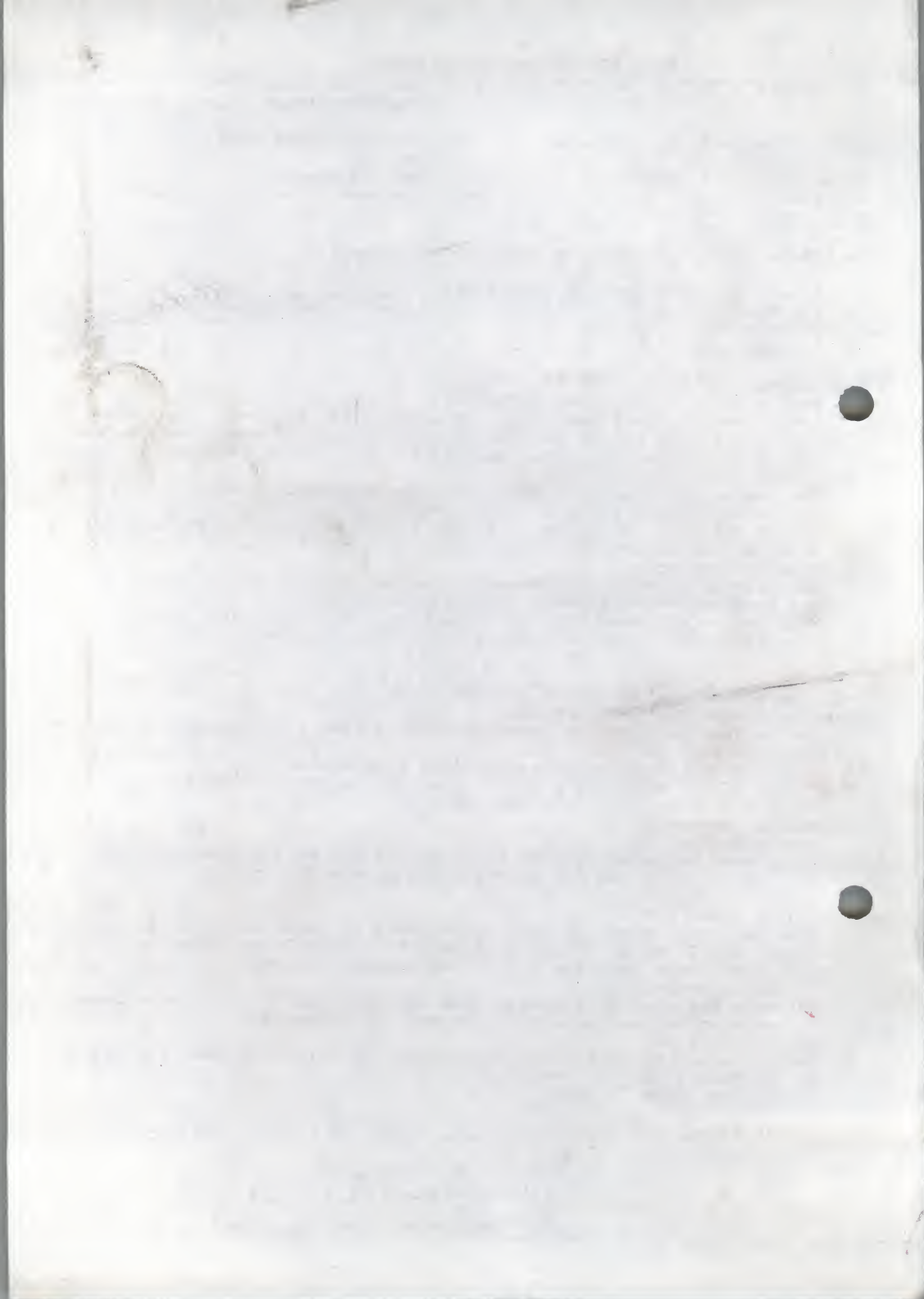
Indien de modificatie al is aangebracht is het level 5107 265 19415.

Zie procedure van "2 layer pcb".

Zie beschrijving "2 layer pcb".

Charles le Fèvre; tst 2699.

*geen spoor tussen U13.2 en U11.5!*  
\*) indien nu U13.2 wordt verbonden met pin 10 v.d. par. poort, werkt het niet! opcode trap! dus verbinding weer weggehaald. 2-12-91







units affected: P3209-008

est.inst.time:

title: R-C network correction on the 1S1P board.

date: 880209 revised:

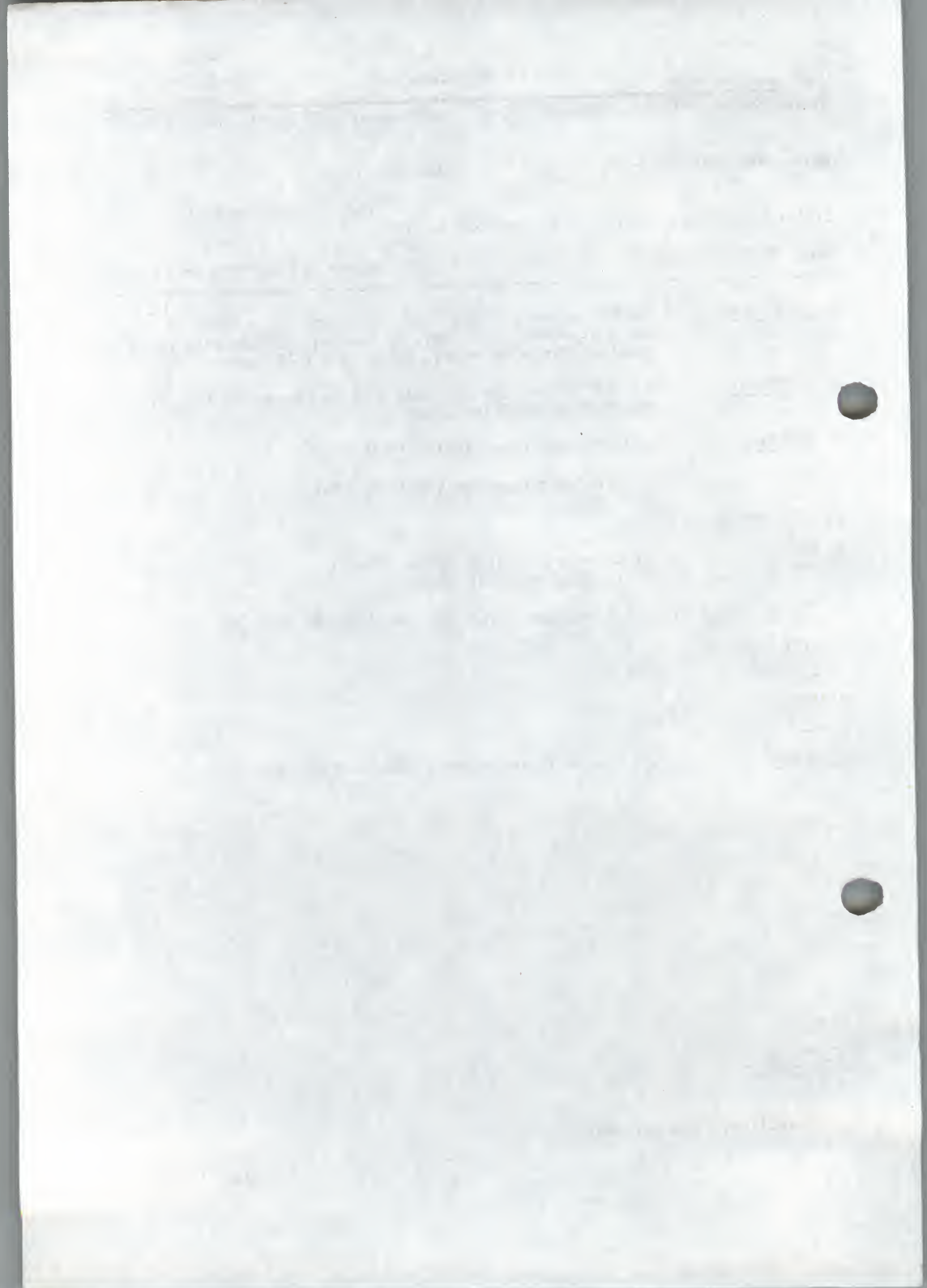
note: PR MSA-034-00133.

this change is: Retrofit on Failure

1. CONDITION : The R-C network on the 1S1P to the interface cable is not correctly terminated. This is causing problems with certain combinations of printers, cables and 1S1P boards.
2. CORRECTION : 8 Ceramic capacitors C24-C31 must be changed on the 1S1P board, from 470pF to 2200pF
3. REMOVE : On 1S1P Board Capacitors C24-C31 470pF
4. ADD : On 1S1P Board Capacitors C42-C31 2200pF
5. ADJUSTMENTS : None
6. PARTS : 8 x Ceramic Capacitor 2200pF 100volt  
Service 12NC 4822 122 30114
7. STATUS CHANGE : 1S1P Board level from 5107 265 13012 to 5107 265 13013
8. TEST FACILITIES  
AFFECTED : None
9. DOCUMENTS  
AFFECTED : None
10. REMARKS : This change is implemented since end November 1987.

Responsibility: C van der Hout







system series: P3000 model: P3204 main assy: Mainboard nr. P3000-079

units affected: P3204

est.inst.time:

title: Parallel port compatible with  
IBM, 1S1P.

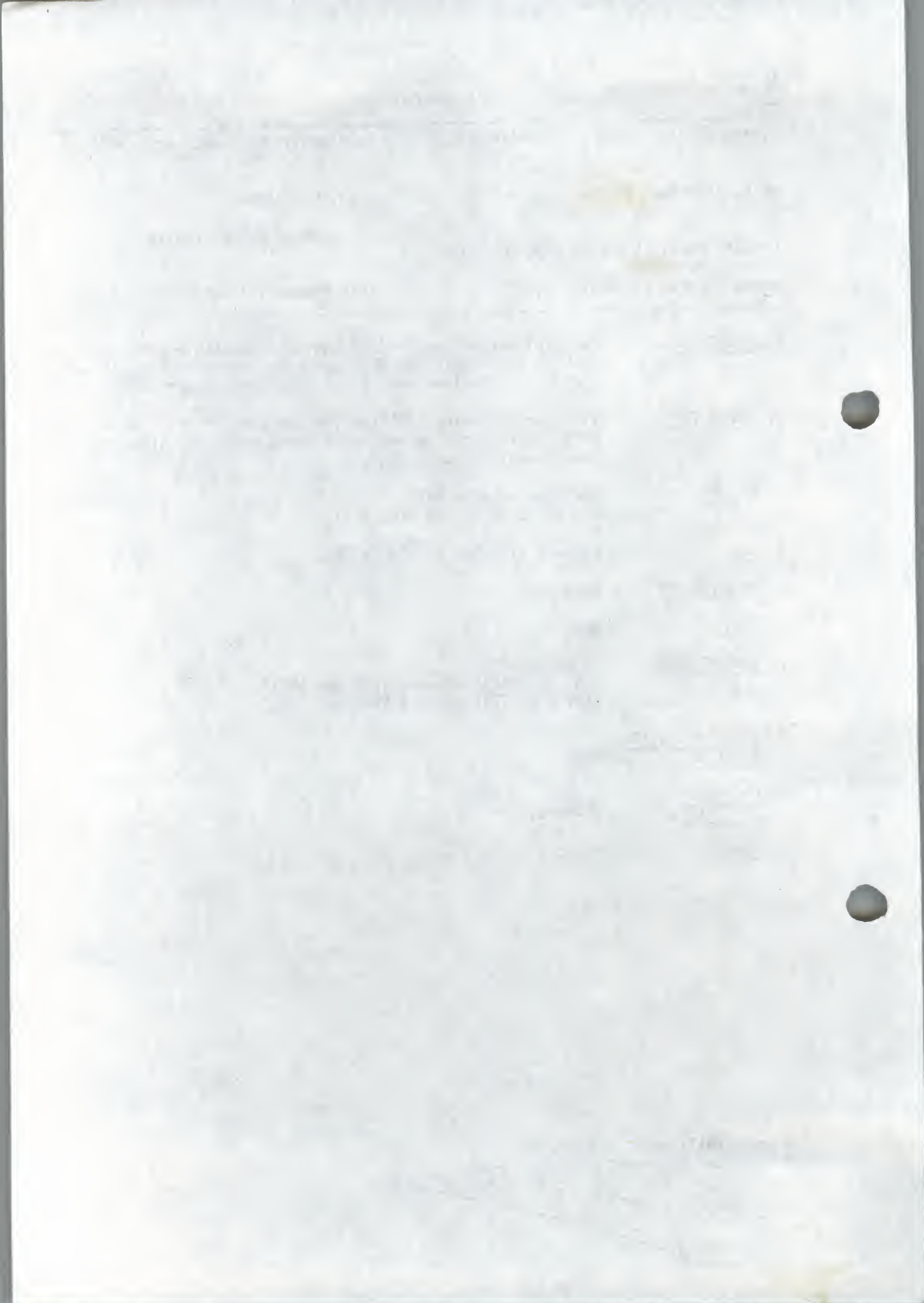
date: 880829 revised:

note: V U PR 248 (MSA-034)

this change is: Retrofit on failure

1. CONDITION : Parallel interface of P3204 was not compatible with IBM 1S1P so that Xenix and OS/2 could not operate the parallel port. Also problems with protection keys occurred.
2. CORRECTION : With the following modification the parallel port of the P3204 systems can be used with Xenix and OS/2, also the protection keys will function.
3. REMOVE : Resistor network RN14  
Cut pin 1 of IC U70 (74LS374)
4. ADD : Connect pin 1 of IC U70 to GND
5. ADJUSTMENTS : None.
6. PARTS : None
7. STATUS CHANGE : P3204 mainPCB:  
5107 265 16736 becomes 5107 265 16737  
5107 265 16741 becomes 5107 265 16742
8. TEST FACILITIES  
AFFECTED : None
9. DOCUMENTS  
AFFECTED : WE-Manual.
10. REMARKS : None.

Responsibility: G.J. Bruntink.





system series: P3000      model: P3X0X      main assy: ISIP board nr. P3000-080

units affected:

est.inst.time:

title: Introduction of 1S1P SMD version.

date: 880829 revised:

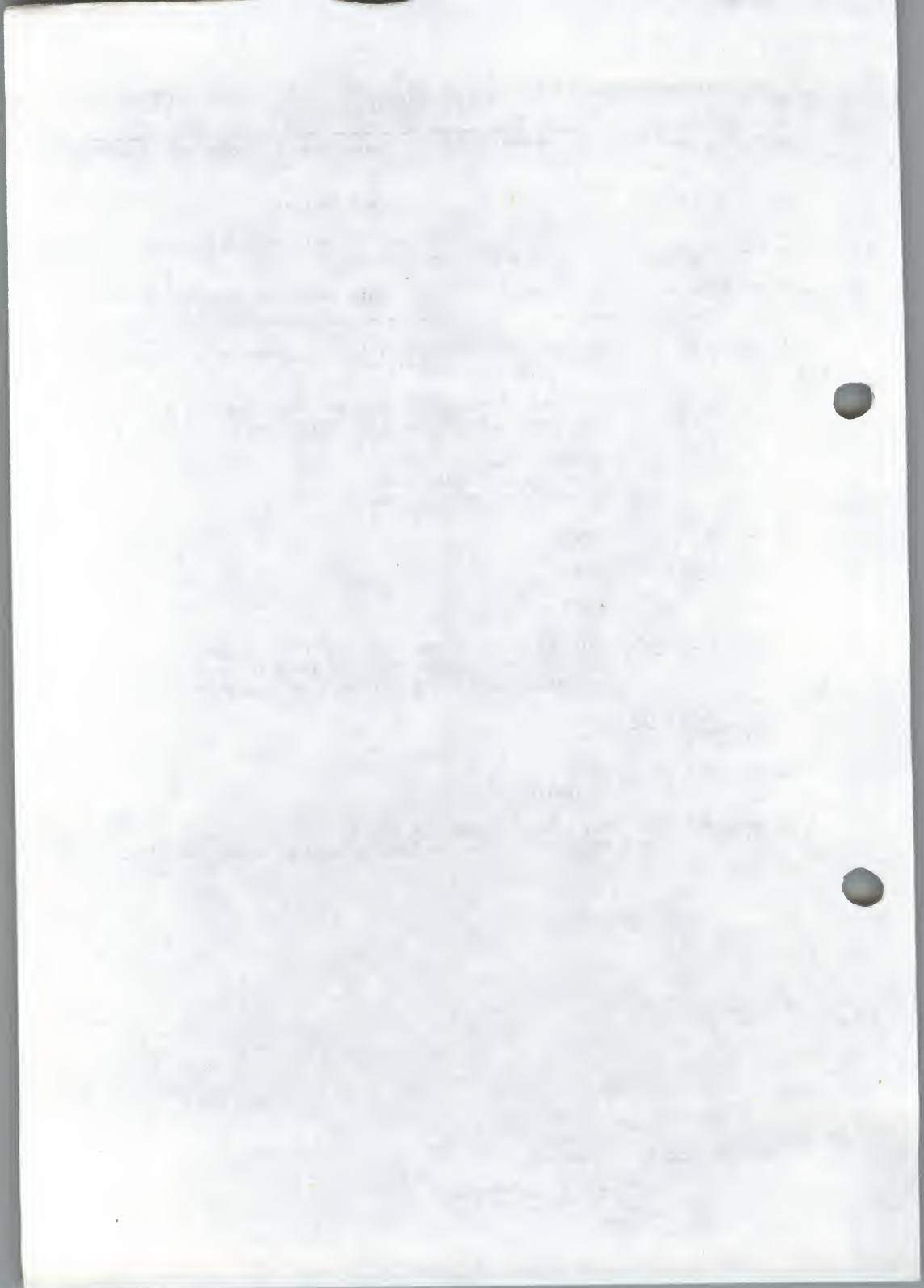
note: VU PR 248      (MSA-034)

this change is: Retrofit on failure

1. CONDITION : The current 1S1P board will be succeeded by a SMD version (a 2-layer and 4-layer).
2. CORRECTION : With the following modification these boards will function with Xenix and OS/2 see also SI P3000-071.
3. REMOVE : Resistornetwork RN1.  
Cut pin 1 of U8 (74LS374)  
Connect pin 1 of U8 to GND.
4. ADD : None.
5. ADJUSTMENTS : None.
6. PARTS : None.
7. STATUS CHANGE : 5107 265 16112 becomes 5107 265 16113 (2 layer)  
5107 265 19411 becomes 5107 265 19412 (4 layer)  
The service 12NC: 5322 216 21789 not changed.
8. TEST FACILITIES  
AFFECTED : None.
9. DOCUMENTS  
AFFECTED : CE-Manual.
10. REMARKS : The 4 layer is for USA only !  
Strap W3 is used for factory testing (always installed).

Responsibility: G.J. Bruntink.





## **15.5. ILP BOARD**

### **15.5.1. Characteristics ILP Board**

The ILP board is the "Intelligent LAN-S Processor" for the PC. This board enables the PC system to be connected to the SOPHO-LAN-S Local Area Network. Up to two ILP Boards may be installed in a PC system each providing the required hardware and firmware to allow suitable software to perform data communication with compatible machines over the network. Data transmission takes place at either 1 or 2 Mbits/s. The onboard firmware provides an IBM PC Network Adaptor NETBIOS software compatible interface, and also a Philips Transport Service interface.

## 15.5.2. Connections ILP Board

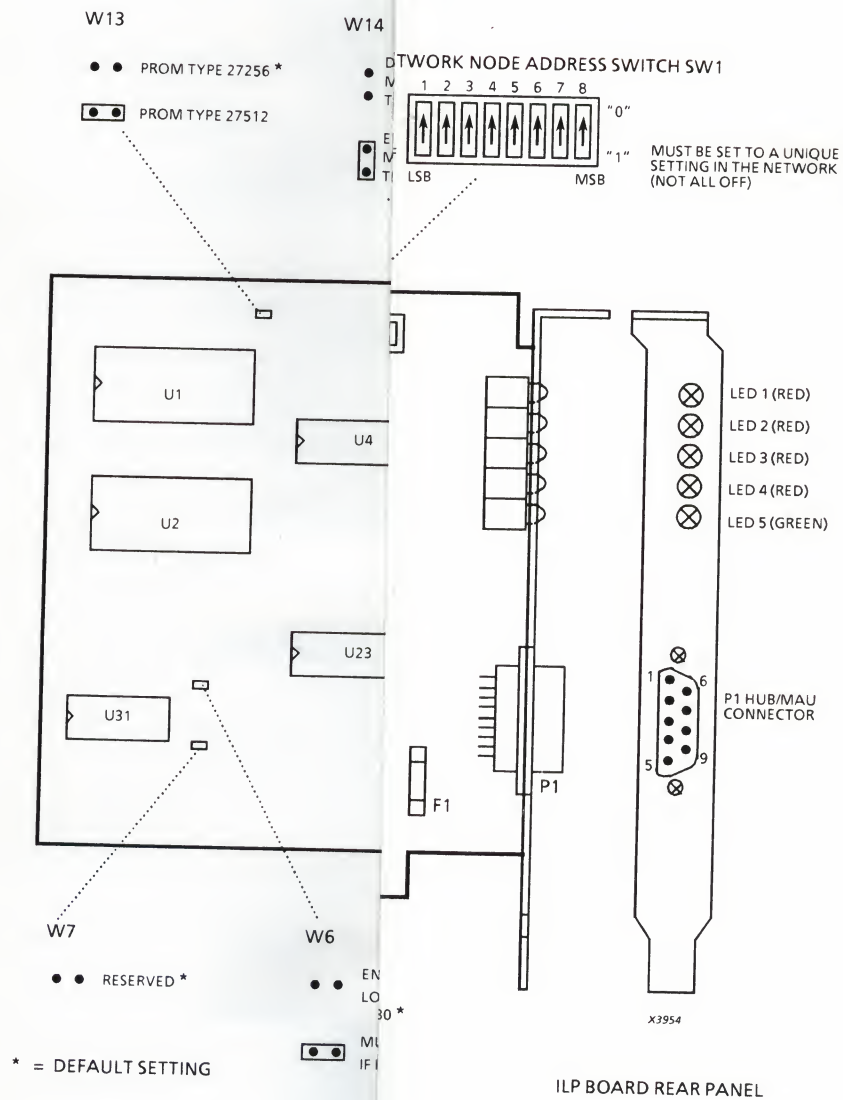
Test Connector P2

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	AD7	2	AD6
3	AD5	4	AD4
5	AD3	6	AD2
7	AD1	8	AD0
9	DT/R-N	10	N.C.
11	WR-N	12	RD-N
13	PCS2-N	14	LA2
15	LA1	16	RESET-N
17	A INT1	18	INTA1-N
19	+5 VDC	20	+5 VDC
21	DEN-N	22	-12 VDC
23	CLKOUT-N	24	GROUND
25	TIMEROUT1	26	PCS1-N

MAU / HUB Connector P1

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	SHIELD	6	DATA -
2	DATA +	7	GATE -
3	GATE +	8	GROUND
4	GROUND	9	+ 12 VDC
5	+ 12 VDC		

### 15.5.3. Strap Settings / Adjustm





#### 15.5.4. Modification History ILP Board

12NC	ROM U1	ROM U2	ROM U20	PAL U4	PAL U23	PAL U33	PAL U34	SI-NR
11011	78101	78091	78051	78011	78061	78081	78071	
11012	78101	78091	78051	78011	78061	78081	78071	
11013	78102	78092	78051	78011	78061	78081	78071	P3200-046 P3100-068

The 5 digit level code is the last 5 digits of the 12 NC of the assembly. This level code is marked on the top surface of the integrated circuits. The 12NC number of the board starts with 5107 265.

12NC	SUBJECT
11011	Initial release by TDS Apeldoorn.
11012	
11013	New ILP firmware to support network management

The firmware level is displayed during the power on sequence or after a reset.

#### 15.5.5. Installation / Maintenance ILP Board

The ILP Board may be installed in any of the option board slots on the main PCB. When installing this board, check that the heatsink on the ILP CPU (U5) does not interfere with an adjacent board, possibly causing a short circuit. The strap settings should be checked, and the node address switch SW1 should be set to a unique value within the network, but with at least one of its switches set to OFF. Ensure that there is no conflict in board address or interrupts used with any other options installed. Power on the system and check that there are no error messages displayed by the power on self test performed by the ILP Board. Turn off system power and install the 9 pin cable connecting the ILP Board to the MAU / HUB.

Refer to manual 5122 991 3432X "Site Preparation Guide LAN-S" for information regarding the other network components.

When exchanging an ILP Board, check that the software in use does not require updating to allow for the change in the unique serial number that each ILP Board has present in ROM.

### 15.5.6. Diagnostic Functions ILP Board

There are separate power on diagnostics and manufacturing test modes, both functions are described in this subsection, the two diagnostic modes share the same basic error messages.

The Power On Self Test (POST) is invoked automatically when the PC is switched on. Each ILP board is tested, any error results are displayed on the monitor, or the LED's on the ILP board rear panel.

Manufacturing Diagnostics mode is activated by installing jumper W14. In this case jumpers W6 and W7 are used to select from among the four possible exercise routines.

W7	W6	DESCRIPTION
OUT	OUT	Manufacturing Burn-In Test (loops indefinitely)
OUT	IN	Network Loop-Back Diagnostics (loops indefinitely)
IN	OUT	RAM Test Loop
IN	IN	Reserved

The *manufacturing burn-in* option will test the dynamic RAM, static RAM, PC interrupts and PROM checksum. The dynamic RAM is tested by both the PC and ILP board CPU's. This test will repeat indefinitely, and the PC will not be allowed to boot.

The *Network Loopback Diagnostics* option tests the ability of the COM9026 to send and receive packets. Varying length packets (testing all possible lengths), are sent to node FF, which is expected to echo them back. The received packets are tested to make sure that they are the same as what was sent. This test will repeat indefinitely, and the PC will not be allowed to boot. In order for this test to function, two ILP boards must be strapped for this diagnostic mode, one with the node address switches set to FF (all off), and one must have at least one of the node address switches on.

The *RAM test loop* option tests the dynamic RAM. The dynamic RAM is tested by both the PC and ILP board CPUs. This test will repeat indefinitely, and the PC will not be allowed to boot.

The results of the test performed by the adapter processor are displayed on the LED's on the rear panel of the machine. At least one of these LED's will be left illuminated (or blinking) at all times, providing a board power-on indication. Another LED will be used to distinguish between the normal operating mode of the controller and the diagnostic mode. While in the diagnostic mode the other LEDs will be used to indicate which test is being performed and the result of that test.

These self-test results will remain displayed on the screen until the PC starts to boot, they will eventually be overwritten.

The PC processor will also display the ILP board serial number, the POST results, node switch setting, and the W6/W7 jumper status.

The following elements are tested on the ILP board:

- Correct 80188 Register, ALU and Address operation
- PROM Checksum Test
- DRAM Read/Write and Refresh Test
- Node Switch Value Identification
- COM9026 Shared RAM Read/Write Test
- COM9026 Interrupts
- Interprocessor Interrupt Test.

There are two possible output devices to indicate the results of the power-on self tests:

LEDs (visible from rear of machine).

Monitor (if the interprocessor interface is functioning).

The possible error messages/indications are listed in three sections, LED output, which covers the status LED codes, ILP Board CPU error messages and PC CPU error messages. The last two are the messages seen on the monitor.

### LED Output

Refer to section 15.5.3. for LED locations. When the PC receives a hardware reset all five of the LEDs are lit.

The LED indications are as follows:

LED 1	LED 2	LED 3	LED 4	LED 5	INDICATION
ON	ON	ON	ON	ON	80188 CPU not executing code properly (CPU reset or malfunctioning, or cannot read ROM)
FLASH	XXX	XXX	XXX	OFF	80188 CPU failed self-test
XXX	FLASH	XXX	XXX	OFF	Adaptor EPROM Checksum Error
XXX	XXX	FLASH	XXX	OFF	Adaptor RAM test failed
XXX	XXX	XXX	FLASH	OFF	COM9026 Test failed
OFF	OFF	OFF	OFF	ON	Normal Operational Mode
R I P P L I N G					Adaptor diagnostics re-entered

Other codes provide software error codes in case a fatal error is detected during network operation mode (see next page).



LED 1	LED 2	LED 3	LED 4	LED 5	INDICATION
					<b>TRANSPORT MODULE FATAL ERRORS</b>
ON	OFF	OFF	OFF	OFF	Null machine pointer in finite state machine
OFF	ON	OFF	OFF	OFF	Invalid finite state machine input event
ON	ON	OFF	OFF	OFF	Invalid finite machine state
OFF	OFF	ON	OFF	OFF	Bad return code from transition code
ON	OFF	ON	OFF	OFF	Not enough memory for machine structures
OFF	ON	ON	OFF	OFF	No available local reference number
					<b>SYSTEM MODULE FATAL ERRORS</b>
ON	ON	ON	OFF	OFF	Out of work queue entries
OFF	OFF	OFF	ON	OFF	Out of timer queue entries
OFF	OFF	ON	ON	OFF	Illegal timer value requested
ON	OFF	ON	ON	OFF	Illegal work queue entry type
					<b>SYSTEMS MANAGEMENT FATAL ERROR</b>
ON	OFF	OFF	ON	OFF	No free records in systems management
					<b>NETBIOS MODULE FATAL ERRORS</b>
OFF	ON	OFF	ON	OFF	Data indication with no RECEIVE pending
ON	ON	OFF	ON	OFF	Not enough memory for NCBs
OFF	ON	ON	ON	OFF	No connection for transport machine pointer
ON	ON	ON	ON	OFF	Connect indication with no LISTEN outstanding
ON	OFF	OFF	OFF	ON	CALL confirm with no CALL outstanding
OFF	ON	OFF	OFF	ON	NCB in wrong queue
ON	ON	OFF	OFF	ON	Out of NCBs
OFF	OFF	ON	OFF	ON	Illegal host interface event
					<b>PROCESSOR-RELATED FATAL ERRORS</b>
OFF	ON	ON	ON	ON	Unexpected interrupt (vector type $\geq 8$ )
ON	ON	ON	ON	ON	Unexpected CPU exception (vector type 0 - 7)

Should any of these errors occur, a hardware reset must be performed.



## ILP Board CPU Error Messages

The following error messages may be generated by the 80188 CPU on the ILP board.

*pass count = 4444*

This message is generated by the manufacturing burn-in tests and indicates the completion of an iteration of the test sequence currently running. The pass count value is a four digit hex number.

*memory error segment 0000 addr. mask FFFF data mask 99*

This message is generated by the memory test routines running on the ILP board CPU for the dynamic RAM and the COM9026 static RAM, and may appear in the normal mode and in the manufacturing burn-in mode. The numbers displayed are all in hex. The error segment will be 0 for the DRAM and E800 for the static RAM. The address mask is the OR of all of the address locations in error, (if one bit is clear in this mask it indicates that the corresponding address line is at fault). The data mask indicates which data bits are in error.

*Adaptor ROM Checksum Error (was : 98C7, S/B 8888)*

*Adaptor ROM Checksum Error (was : 8888 , S/B 9999)*

These messages are generated by the routine that performs a checksum on the 27256 PROMs on the ILP board, and may appear in either the normal operational diagnostics or in the manufacturing burn-in mode.

*COM9026 POR would not reset*

This message is generated by the test of the COM9026 status operation. It will appear when the POR status bit in the COM9026 status port will not clear.

*Missing interrupt from COM9026*

This message occurs if a status bit in the COM9026 is set, but no interrupt request appears at the CPU when the corresponding bit is set in the COM9026 interrupt enable register.

*Extra interrupt from COM9026*

This error occurs when the COM9026 POR bit and interrupt enable mask are all clear, but an interrupt request is present on the 80188 INTO line.

*No token received (TA bit would not clear)*

This message is generated by the COM9026 remote loopback diagnostics in the manufacturing burn-in mode. This error message probably indicates that no token is being passed, due to the absence of other nodes on the network.

*No token received (RI bit would not clear)*

This message is generated by the COM9026 remote loopback diagnostics in the manufacturing burn-in mode. This message most likely indicates the lack of stable token passing. The receiver inhibit bit is checked before the transmitter available bit is checked, so this message is much more likely to appear than the previous message.

*COM9026 remote loopback data error - user size : 8890 mask = 01*

This message is generated by the COM9026 remote loopback diagnostics in the manufacturing burn-in mode. It indicates that the packet received in the remote loopback does not agree with the transmitted packet. The mask indicates which bits are in error. The user size indicates the size of the frame that was sent.

*COM9026 remote loopback error - time-out on receiving echo*

This message is generated by the COM9026 remote loopback diagnostics in the manufacturing burn-in mode. It indicates that a packet was sent but that no echo was received.

*COM9026 remote loopback test - echo node (FF)*

This message is generated by the COM9026 remote loopback diagnostics in the manufacturing burn-in mode. It indicates that the remote loopback diagnostics have been invoked and that the station has node number FF (all switches off or open), and is now echoing all received messages back to the sender.

*COM9026 remote loopback test*

This message is generated by the COM9026 remote loopback diagnostics in the manufacturing burn-in mode. It indicates that the remote loopback diagnostics have been invoked and that the station does not have node number FF, (at least one switch is closed or on). The station is now continuously sending diagnostic packets to node FF.

## PC CPU Error Messages

The following messages are generated by the 8088 PC CPU when it executes the diagnostic code in the NETBIOS PROM if it powers up.

S/N 0123456789ab jumpers xx POST yy Vers. ab.cd Sub-s 00 Node 7E INT02

This message is displayed on command from the ILP board CPU. The fields have the following meaning:

S/N 0123456789ab	Board serial number as read from PROM U31. This is a 12 hex digit serial number unique to each board.
Jumpers xx	This is a two hex digit number indicating the status of jumpers W7 and W6. Value C0 or 80 indicates that W7 is installed, C0 or 40 indicates that W6 is installed. FF means that PROM U31 is absent, other values probably mean that it is programmed incorrectly.
POST yy	This byte is the ILP board power-on self test result, and is the value that the ILP board has written to the LED latch IO port.
Vers ab.cd	The level of the 80188 firmware on the ILP board, as read from the PROM U1.
Subs 00	The substation address, always zero.
Node 7E	The value of the node switch on the ILP board.
INT02	Indicates which PC interrupt line that the ILP board will use, value will be 02 or 03.

### ILP #0

This message indicates that the PC is running the power-on self test for the ILP with jumper W8 installed. This indicates that the PC has determined that the ILP is present. Absence of this message most likely indicates that jumper W10 enabling the NETBIOS PROM has been removed from the ILP. Both this message and the following one will appear if two ILP boards are installed.

### ILP #1

This message indicates that the PC is running the power-on self test for the ILP with jumper W8 removed. This indicates that the PC has determined that the ILP is present. Absence of this message most likely indicates that jumper W10 enabling the NETBIOS PROM has been removed from the ILP.



#### *dead*

This message indicates that the ILP under test is apparently dead. It is generated when the PC times out trying to set the I/O control port.

#### *control port error*

This message is generated as a result of the PC testing whether the upper two bits of the control port can be independantly set and reset.

#### *semaphore error...sum = 09 command = 87*

This message is generated when the PC is waiting for a command from the ILP board CPU. The ILP board CPU passes these commands by writing a command byte to a location in the shared memory and the 2's complement of this byte to the next location. When the PC CPU reads the command it ensures that the second byte is the 2's complement of the first. This message appears when the sum of the two bytes is non-zero, the sum of the two bytes is displayed as is the value of the command byte.

#### *illegal diagnostic command*

This message is generated when the PC reads a command byte that is greater than 0AH.

#### *host memory error: mask 88*

This message is generated when the PC is testing the ILP board memory on command from the ILP board. It indicates that at least one bit was read incorrectly. The mask is the OR of all bits in error in all locations.

#### *adaptor did not receive interrupt*

This message is generated when the PC and ILP board processors are testing the ability of the PC to interrupt the ILP board. The ILP board first commands the PC to generate an interrupt, if it does not receive an interrupt it issues a command to the PC to display this message.

#### *no interrupt from adaptor*

This message is generated when the PC and ILP board processors are testing the ability of the ILP board to send an interrupt to the PC. This message appears if no interrupt was generated, if it occurs, check to see that one of jumpers W9 or W11 is installed.



*double interrupt from adaptor*

Refer to the previous error message. This message occurs when the interrupt from the ILP board appears on both the INT2 and INT3 lines of the PC. It probably means that both of the jumpers W9 and W11 are installed (only one should be present).

*host memory test failure - mask = 99*

This message is displayed when the PC tests the shared memory at power-on. This is done once per ILP board after receiving any command from the ILP board. If it fails this test the PC does not bother to wait for any commands from this ILP board, proceeding to test the next ILP board (if any).

## 15.6. IDEA MINICOM BOARD

### 15.6.1. Characteristics IDEA MINICOM Board

The IDEA MINICOM board permits communication at a programmable baudrate of maximum of 19.2 kilobits per second. Channel B of the on board Zilog 8530 SCC is used for the asynchronous, byte synchronous, or bit synchronous RS-232 communications. Channel A of the SCC is used for control and status only. Supported protocols are IBM bisync and both NRZ and NRZI SDLC and HDLC.

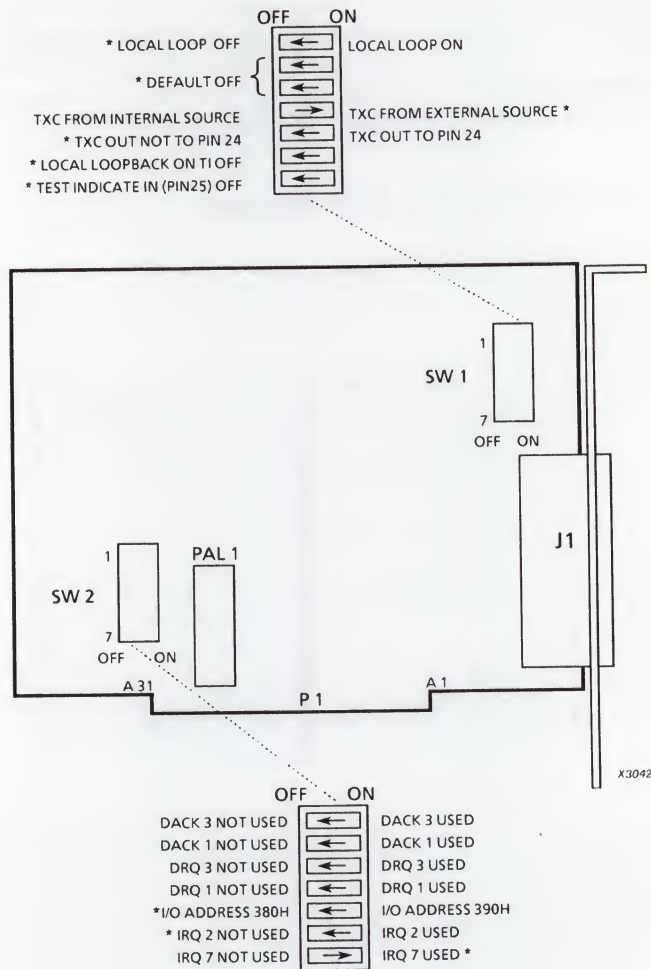
### 15.6.2. Connections IDEA MINICOM Board

Interface Connector 1 (25-PIN Male)

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	SHIELD	14	n.c.
2	TXD (O)	15	TXC (O) *
3	RXD (I)	16	n.c.
4	RTS (O)	17	RXC (I)
5	CTS (I)	18	LLoop (O) *
6	DSR (I)	19	n.c.
7	GROUND	20	DTR (O)
8	DCD (I)	21	n.c.
9	n.c.	22	RI (I)
10	n.c.	23	Rate Sel (O)
11	Select Standby	24	TXC (O) *
12	n.c.	25	TI (I) *
13	n.c.		

**NOTE:** The function of the signals marked with \* can be disabled by the setting of SW1. The signal Select Standby on pin 11 is a none V.24 standard output, programmable by the loaded software.

### 15.6.3. Strap Settings / Adjustments IDEA MINICOM Board



\* DEFAULT SETTINGS

#### 15.6.4. Modification History IDEA MINICOM Board

SI-NR	SUBJECT
P3100-049 P3200-026	IDEA Minicom board connected to multiline coupler. Other communication channels get corrupted. (Hardware Modification)

#### 15.6.5. Installation / Maintenance IDEA MINICOM Board

This board plugs into either a PC or AT I/O slot. Ensure that there is no conflict in board I/O address, DMA channel or interrupt level used with any other options installed.

#### 15.6.6. Diagnostic Functions IDEA MINICOM Board

The signal Local Loopback (Pin 18) can be shorted to Test Indicate In (Pin 25) by switch SW1-6 in the ON position.





## 15.7. LWSI-CONTROLLER

### 15.7.1. Characteristics LWSI-Controller

The LWSI-Controller based on a 8088 microprocessor, and equipped with a Zilog Z8530 Serial Communication Controller, provides the PC with a direct link to the PHILIPS P4000, P6000 or P9000 minicomputer systems. On board static RAM (16kByte or 24kByte) is mapped as dual port RAM into the PC memory address space. An X.24/X27 (including LWSI) or an V.24/V28 (RWSI) type of interface can be supported by the controller. When connected to the P4000 system, the PC will emulate the P2766 non-intelligent terminal. As extra feature to this a file-transfer facility, to transfer data files to and from the P4000 system, is available. Connected to the P6000 system the PC will emulate the VD81 terminal. An RWSI connection may be a fixed or switched V.24 connection, however the switched type of connection has to be established manually. The LWSI or RWSI workstations emulated with this board will act as a secondary station.

There are two versions in use. The only difference is the location of W22 and W23.

### 15.7.2. Connections LWSI-Controller

Interface Connector 1 (25-PIN Female)

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	SHIELD	14	n.c./TB
2	103.TA	15	114/CB
3	104.CA	16	n.c./RB
4	105.RA	17	115/IB
5	106.IA	18	SB/141
6	107.SA	19	BB/n.c.
7	102.BA	20	108
8	109.G	21	140
9	133	22	125
10	n.c.	23	111
11	n.c.	24	113
12	n.c.	25	142
13	n.c.		

**NOTE:** Which type of signal is tied to the related pin is determined by the strap setting of the interface (X.24 or V.24)

### 15.7.3. Strap Settings / Adjustments LWSI-Controller

The LWSI board requires a free PC memory space of 24KB. The memory area used can be selected with straps W22 and W23. The base address of the LWSI memory within the selected area is determined by SW1-1 through SW1-3 (see next tables).

Strap Setting W22 / W23 base address LWSI memory

STRAP POSITION		MEMORY AREA	COMMENT
W23	W22		
2-3	2-3	80000-9C000	
1-2	2-3	A0000-BC000	
2-3	1-2	C0000-DC000	Recommended for PTS and P4000
1-2	1-2	E0000-FC000	

### SWITCH 1

SW1-1 till SW1-3 base address selection

SW1-1	SW1-2	SW1-3	W23 = 2-3 W22 = 2-3	W23 = 1-2 W22 = 2-3	W23 = 2-3 W22 = 1-2	W23 = 1-2 W22 = 1-2
OFF	OFF	OFF	80000	A0000	C0000	E0000
OFF	OFF	ON	84000	A4000	C4000	E4000
OFF	ON	OFF	88000	A8000	C8000	E8000
OFF	ON	ON	8C000	AC000	CC000	EC000
ON	OFF	OFF	90000	B0000	D0000	F0000
ON	OFF	ON	94000	B4000	D4000	F4000
ON	ON	OFF	98000	B8000	D8000	F8000
ON	ON	ON	9C000	BC000	DC000	FC000

**NOTE:** Adapt the address parameter (A = xxxx) for DLWSI.BIN in the config.sys file to the above selected value, see section 15.7.5.

SW1-4 till SW1-8 on board RAM and interrupt level used.

SWITCH 1		DESCRIPTION
4	ON OFF	24KB RAM available 16KB RAM available
5	ON	IRQ 7 *
6	ON	IRQ 5 *
7	ON	IRQ 3 *
8	ON	IRQ 2 *

\* note: normally SW5-8 are set to off

#### SWITCH 2 (link address):

Switch SW2-1 through SW2-8 determine the link address of the LWSI-controller. SW2-1 forms the MSB bit and SW2-8 forms the LSB bit of the address. The link address may vary from 1 to 63 decimal and is always odd. The workstation number normally used in the P4000 and P6000 environment can be determined via the next equation.

$$\text{LINK ADDRESS} = \{\text{WORKSTATION NUMBER} \times 2\} - 1$$

#### Strap Settings For LWSI

STRAP	POSITION	FUNCTION
W1	IN	TB to interface pin 14
W2	OUT	Interface pin 15 not connected
W3	2-3	TA to interface pin 2
W4	IN	RB to interface pin 16
W5	OUT	Not used for LWSI
W6	OUT	Not used for LWSI
W7	OUT	Not used for LWSI
W8	OUT	Interface pin 17 not connected
W9	OUT	Interface pin 18 not connected
W10	OUT	Interface pin 19 not connected
W11	1-2	Internal baudrate generator used
W12	1-2	Baudrate generator of SCC used as timer
W13	OUT	Not used for LWSI
W14	IN	Processor clock active
W15	OUT	Interface pin 5 not connected
W16	OUT	Interface pin 3 not connected
W17	2-3	G to interface pin 8
W18	OUT	Interface pin 6 not connected
W19	2-3	RA to interface pin 4
W20	OUT	Interface pin 7 not connected
W21	IN	Peripheral clock active



## Strap Settings For X.24 Interface

STRAP	POSITION	FUNCTION
W1	IN	TB to interface pin 14
W2	2-3	CB to interface pin 15
W3	2-3	TA to interface pin 2
W4	IN	Not used for X.24
W5	OUT	Not used for X.24
W6	OUT	Not used for X.24
W7	OUT	Not used for X.24
W8	2-3	IB to interface pin 17
W9	2-3	SB to interface pin 18
W10	IN	BB to interface pin 19
W11	2-3	Signal Element Timing Used
W12	1-2	Baudrate generator of SCC used as timer
W13	OUT	Not used for X.24
W14	IN	Processor clock active
W15	2-3	IA to interface pin 5
W16	2-3	CA to interface pin 3
W17	2-3	G to interface pin 8
W18	2-3	SA to interface pin 6
W19	2-3	RA to interface pin 4
W20	2-3	BA to interface pin 7
W21	IN	Peripheral clock active

## Strap Settings For V.24 (RWSI)

STRAP	POSITION	FUNCTION
W1	OUT	Interface pin 14 not connected
W2	1-2	114 to interface pin 15
W3	1-2	103 to interface pin 2
W4	OUT	Interface pin 16 not connected
W5	OUT	Extra delay at 107
	IN	Normal delay at 107 (See note 1)
W6	OUT	Extra delay at 104
	IN	Normal delay at 104 (See note 1)
W7	OUT	Extra delay at 114
	IN	Normal delay at 114 (See note 1)
W8	1-2	115 to interface pin 17
W9	1-2	141 to interface pin 18
W10	OUT	Interface pin 19 not connected
W11	1-2	Baudrate generator of SCC used as timer
W12	1-2	Internal baudrate generator used (See note 2)
	2-3	115 used as receiver element timing (See note 3)
W13	1-2	114 used as transmitter element timing (See note 3)
	2-3	113 provided by internal generator (See note 2)
W14	IN	Processor clock active
W15	1-2	106 to interface pin 5
W16	1-2	104 to interface pin 3
W17	1-2	109 to interface pin 8
W18	1-2	107 to interface pin 6
W19	1-2	105 to interface pin 4
W20	1-2	102 to interface pin 7
W21	IN	Peripheral clock active

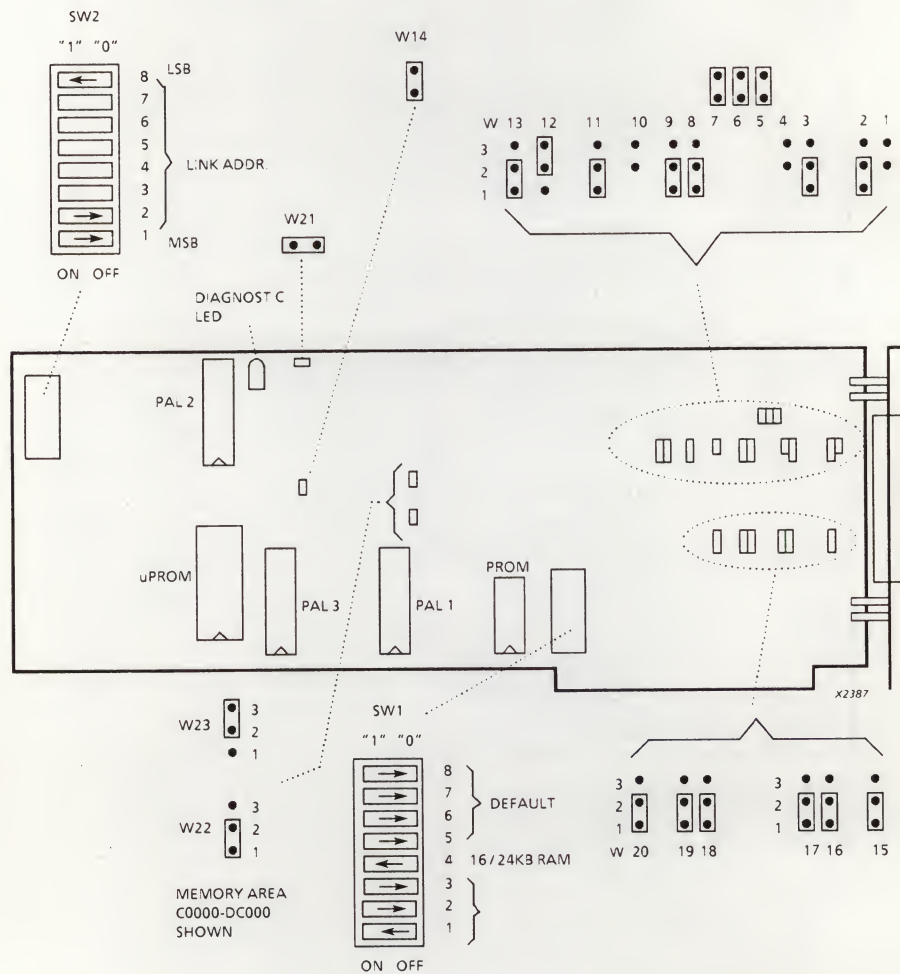
**NOTE 1:** For modem connection only.

**NOTE 2:** Internal baudrate clock

**NOTE 3:** External baudrate clock

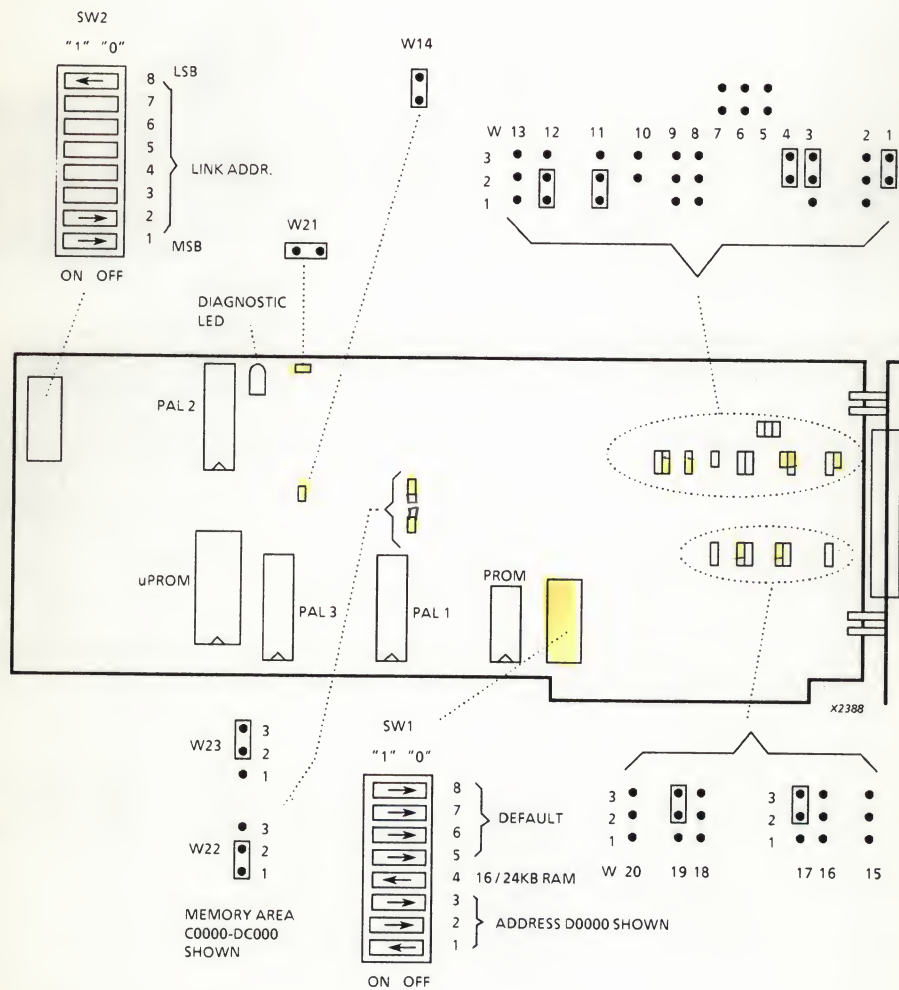
**Strap Locations LWSI-Controller (12NC 5122 291 9952x,  
5122 292 1791x,  
5122 292 0780x)**

**RWSI Connection**



# Strap Locations LWSI-Controller (12NC 5122 291 9952x, 5122 292 1791x, 5122 292 0780x)

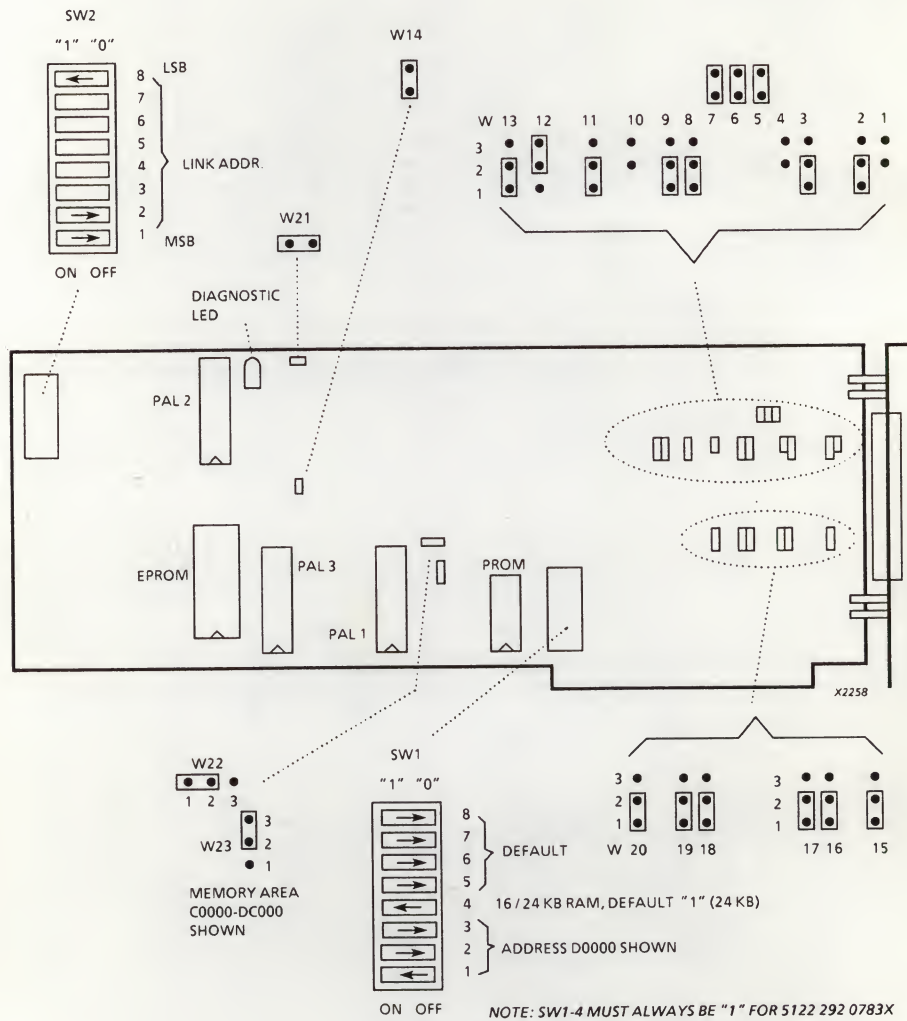
## LWSI Connection





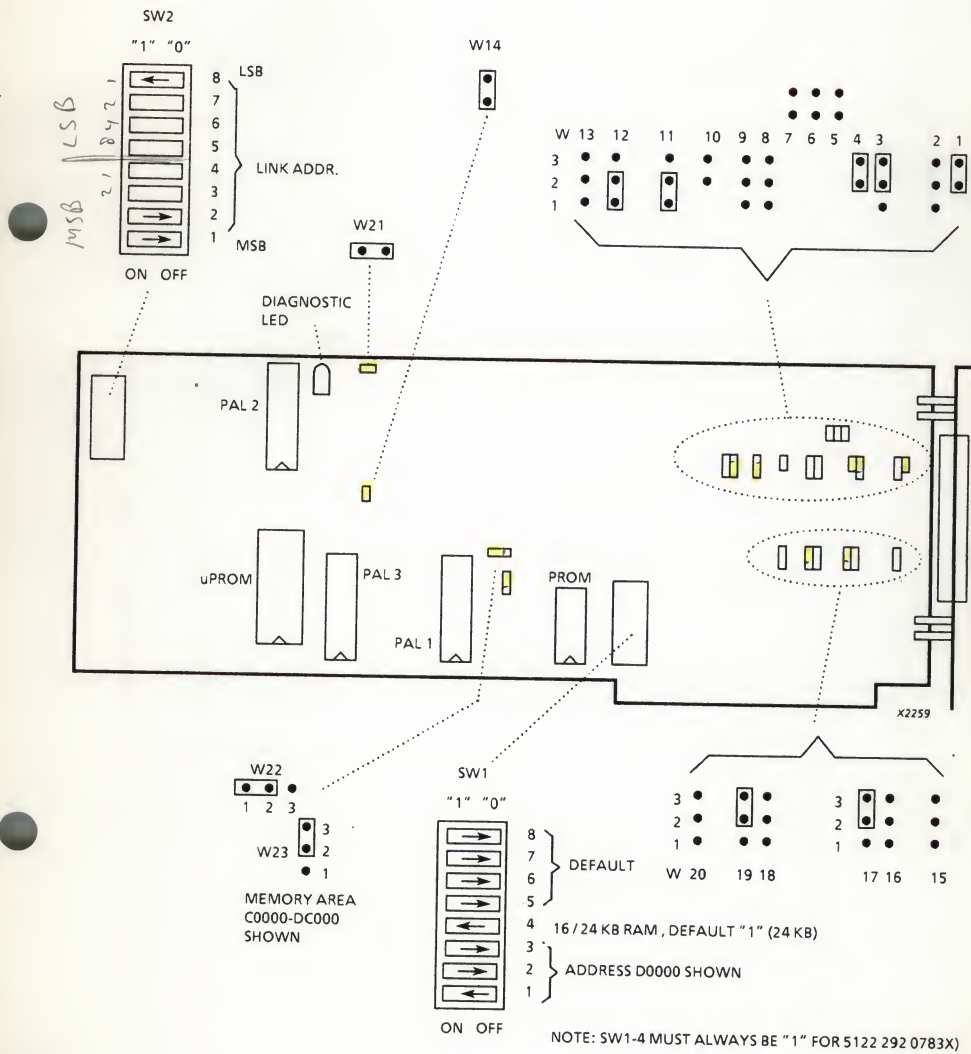
# Strap Locations LWSI-Controller (12 NC 5112 292 0781x 5122 292 0782x 5122 292 0783x)

## RWSI Connection



# Strap Locations LWSI-Controller (12 NC 5112 292 0781x 5122 292 0782x 5122 292 0783x)

## LWSI Connection



#### 15.7.4. Modification History LWSI-Controller

12NC 5122-	SUBJECT	SI NR
291 99522	Initial release	
291 99523	Memory Read signal correction	
291 99524	Firmware version 03643	
291 99525	Clock Circuit change	
291 99526	Clock Circuit change	
291 99527 292 07801	Firmware version 03644 Introduction 5122 292 07801	
291 99528 292 07802	Strappable address selection	
291 99529 292 07803	Solving communicating problems with P4000 P6000 P9000 systems, firmware version 03645	
291 17911 292 07804 292 07811	Upgrade for compatibility with new board 5112 292 07811 Solving communication problems Introduction 5122 292 07811	
291 17912 292 07805 292 07812 292 07821	Introduction of new firmware version 03646  Introduction 5122 292 07821	
292 07806 292 07813 292 07822	Introduction of new firmware version 03647	137
292 07807 292 07814 292 07822	Introduction of new firmware version 03648, solving various communication problems	175
292 07808 292 07815 292 07823 292 07832	solving various communication problems: - Introduction of new firmware version 03649 - Add wire between pin 17 of IC at position C7C7 (74LS240) and GND	284

### 15.7.5. Installation / Maintenance LWSI-Controller

The LWSI controller may be installed in any of the option board slots of the main board. Ensure that there is no conflict in board address or interrupts used with any other options installed. The link address switch SW2 should be set to an unique address within the total configuration of the minicomputer system. The link address may be in the range 1 to 63 decimal and is always odd (SW2-8 link address LSB bit is on). The setting of the link address can be overruled by a device driver installed at power on time. This device driver must also be informed about the start address of the dual port RAM. Special cable types are defined for the connection of this board to the P4000, P6000 and P9000 systems, see for cable description chapter 15.7..2.

### P4000 / P6000 Installation Requirements

	P3X0X	P4000	P6000
Hardware	LWSI Controller	P4000- 53 63 DCP-H	
Cables	Type 97 (LWSI) TYPE 11 (RWSI)		
Software see product catalogue for 12 NC	MS-DOS 2.2 or higher Emulator Software	Syst. Softw. Rel. 27 or higher Emulator Software Rel. 27: conf. as P2766 Rel. 28: conf. as P3100 DHB present for File Transfer	Installed for VD81 without CRH1 board.



Indien ook LWSI van Pyxco aanwezig is, moet deze bij constructie als volgt:  
A=C800 LC02 etc.  
x aangepaste EMI 711 (6u Logic Channel 0 of 2)

## LWSI Controller Device Driver

It is necessary to instal the device driver DLWSI.BIN in the CONFIG.SYS file. therefore add the following line into the config.sys file:

device = DLWSI.BIN <parameters>

The parameters are separated by a space character, and there is no restriction for the sequence in which they are placed in the list. The end of the parameter list is indicated by a carriage return or a line feed. If a parameter is not placed in the list the default values are choosen.

### Parameter Values:

A = xxxx	Start address of the dual port RAM, the value of x is 0-F. The four nibble address (Hex) is the segment address where the dual port ram starts, this value must be the same as strapped on the controller board. Default 8000H.
RWSI	Defines the connection type LWSI or RWSI. If omitted then the connection type LWSI is selected.
DUPLEX	In RWSI connection, if this parameter is present, the V24 circuit 105 is always on. If this parameter is not present the signal 105 will be on for sending and off for receiving (Half Duplex).
1200-19200	Baudrate selection if RWSI with internal clocking. If this parameter is not present, external clocking is selected. Format: 1200, 2400, 4800, 9600 or 19200.
NRZI	If RWSI interface, data encoding NRZI is selected, if omitted NRZ is selected.
INFO	Information of LWSI RWSI installation will be displayed if this parameter is in the parameter list. See section 15.4.6 diagnostic functions for more info.
LCOA or LCOB or LCOC	Normally LCOA is used for the first LWSI-CO, LCOB for the second LWSI-CO and LCOC for the third LWSI-CO. This parameter must uniquely identify the LWSI-CO. For compatibility reasons also LCO1, LCO2, LCO3 or LCOX may be used. <b>Note:</b> The character behind LC is the letter o, not the digit 0 If the parameter is omitted, LCO1 is taken.

HA = <HDLC-address>

B: HA=29 (=41 dec.)

HLC = <number>

This parameter specifies the HDLC address on which the LWSI-CO reacts at the line. <HDLC-address> is a string of two characters which forms the hexadecimal address. If <HDLC-address> is FF or if the parameter is omitted, the HDLC address is taken from switch on the LWSI-CO.

This parameter specifies the highest number that shall be supported. The range for the highest logical channel is 0 to 15.

<number> is a string of one or two decimal digits

If the parameter is omitted the highest logical channel is 9.

WS = <window sizes>

10 x 7  
WS = 77777777

n=4 (14 x 00)  
17=7 (19 x 00)

Each logical channel knows a "send window size" which influences the behaviour of the simple-link-sharing-protocol (SLSP): If n is the selected "send window size", the driver expects an acknowledging RR-packet at least after having n data-packets.

<window sizes> is a sequence of characters, the first character for logical channel 0, the second character for logical channel 1, and so on. The last character is valid for all remaining channels up to the highest logical channel as specified with parameter HLC = ... Each character must be in the range "1" to "7" or must be "X". The character "X" specifies a "send window size" of the default value 4.

Example: WS = 341X7 The specified "send window size" are 3 for channel 0, 4 for channel 1, 1 for channel 2, default (4) for channel 3 and 7 for channel 4 and for all higher channels.

Example: WS = 5 5 is the "send window size" for all logical channels.

If the parameter is omitted, 4 is the "send window size" for all logical channels.

WR = <window sizes>

This parameter specifies the receive window size.

For syntax description, see WS (send window size)

For compatibility reasons the character "7" specifies a "receive window size" of 1, i.e. each single data-packet is acknowledge by an RR-packet. The character "X" specifies a "receive window size" of the default value "7" (equal to 1)

If the parameter is omitted, "7" (equal to 1) is the "receive window size" for all logical channels.

**IMPORTANT NOTE:** Don't use this parameter if the LWSI-CO has a PROM level below 9, i.e. if the 12NC is less than 5122 208 03469.

## 15.7.6. Diagnostic Functions LWSI-Controller

### Power on Selftest

The on board firmware performs a selftest after power on. During this selftest the on board LED is switched on. If no failure is found the LED is switched off.

### Driver Board test

When booting of the operating system is completed and the installed LWSI driver detects an error on the LWSI controller then one of the following error messages is displayed on the screen.

#### **DLWSI.BIN: \*\*\* error hardware missing \*\*\***

The LWSI driver is not able to read the LWSI Controller RAM. This may occur if the board is not installed, or if the adjusted address is not equal to the address specified in the parameter list of the device driver. If none of these errors are made then the processor of the LWSI controller is not running correctly.

#### **DLWSI.BIN: \*\*\* error self-test \*\*\* 0 1 2 3 4 5 6 7 8 9 A B C**

The LWSI controller is not operable due to a hardware error. Additional to this error message the LWSI device driver displays the selftest results in an array of 13 bytes (0 to C). The errors indicated are described next.

Byte 0:           00 no error  
                  01 error at RAM test  
                  02 error at SCC-1 test (start stop mode)  
                  03 error at SCC-2 test (sdhc mode)

Byte 1-C:        These bytes give a more detailed information about the error if one has been detected. It is not the intention of this manual to describe this. If byte 0 indicates a fault area replace the board.



**DLWSI.BIN: \*\*\* error unknown service identity \*\*\***

The LWSI controller board cannot work together with the driver installed in CONFIG.SYS due to different versions. Change the LWSI controller or the driver.

**DLWSI.BIN (.....) \*\*\* error in CONFIG.SYS parameter \*\*\***

One or more of the parameters passed to the driver is wrong, between the brackets the parameter list is displayed started with the first wrong parameter.

**Configuration information**

If the information parameter ("INFO") is added to the device driver in the CONFIG.SYS file the next message will be displayed when the LWSI installation is correct.

DLWSI.BIN: LWSI/RWSI version 2.0x

DLWSI.BIN: driver identification = 12NC 8701 964 6xxxx (version of driver)

DLWSI.BIN: service identification = 12NC 5112 208 0364x (ROM version)

DLWSI.BIN: service self-test result = 0 1 2 3 4 5 6 7 8 9 A B C (See above)

DLWSI.BIN: send window size = n n n n n n n n n (n = 1 to 7)

DLWSI.BIN: logical channels = . . . . .

DLWSI.BIN: HDLC address = x x

DLWSI.BIN: physical layer type = LWSI (if LWSI selected)

DLWSI.BIN: physical layer type = RWSI, duplex/half duplex, NRZ NRZI,  
clock external/clock internal xxxx bps  
(if RWSI selected)





## **15.8. SPB-A SERIAL / PARALLEL BOARD**

### **15.8.1. Characteristics SPB-A Board**

This module plugs into either a PC or AT I/O slot. It contains two serial communication ports (COM1 and COM2) and one parallel printer port. The parallel port similarly can be designated either to LPT1, LPT2 or LPT3 depending on other parallel ports in the system.

### 15.8.2. Connections SPB-A Board

Serial Interface connector (External 25D male connector).  
This external 25D connector is via a ribbon cable connected to J2.

External 25D Connector

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	SHIELD	14	N.C.
2	TXD (O)	15	N.C.
3	RXD (I)	16	N.C.
4	RTS (O)	17	N.C.
5	CTS (I)	18	N.C.
6	DSR (I)	19	N.C.
7	GROUND	20	DTR (O)
8	DCD (I)	21	N.C.
9	N.C.	22	RI (I)
10	N.C.	23	N.C.
11	N.C.	24	N.C.
12	N.C.	25	N.C.
13	N.C.		

(O): Output Signal

(I) : Input Signal

Serial Port 2 Connector J2

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	N.C.	2	RI (I)
3	DCD (I)	4	DTR (O)
5	GROUND	6	DSR (I)
7	CTS (I)	8	RTS (O)
9	RXD (I)	10	TXD (O)

Serial Port 1 Connector J3 (9-PIN Male)

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	DCD (I)	6	DSR (I)
2	RXD (I)	7	RTS (O)
3	TXD (O)	8	CTS (I)
4	DTR (O)	9	RI (I)
5	GROUND		

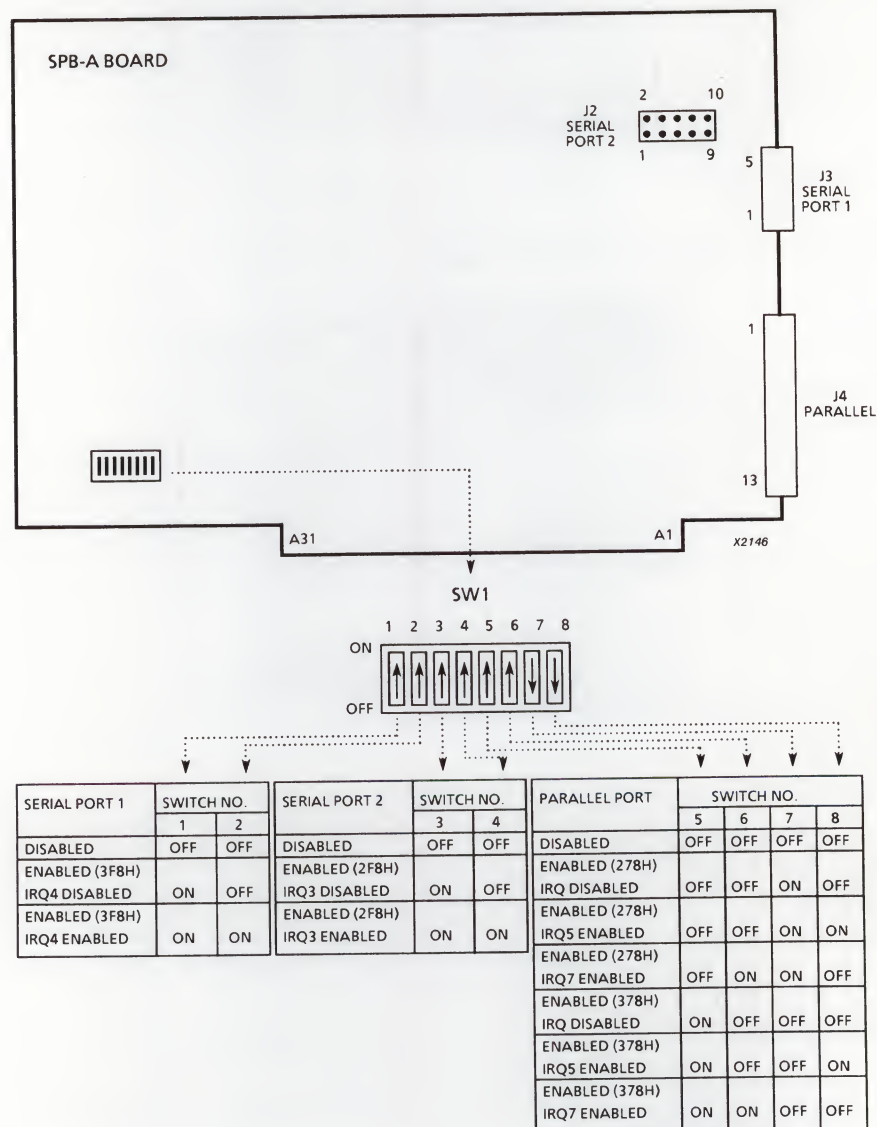
Parallel Port Connector J4 (25-PIN Female)

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	STROBE-N	14	AUTO FEED-N
2	DATA1	15	ERROR-N
3	DATA2	16	INIT-N
4	DATA3	17	SELECT IN-N
5	DATA4	18	GROUND
6	DATA5	19	GROUND
7	DATA6	20	GROUND
8	DATA7	21	GROUND
9	DATA8	22	GROUND
10	ACK-N	23	GROUND
11	BUSY	24	GROUND
12	PAPER END	25	GROUND
13	SELECT		



### 15.8.3. Strap Settings / Adjustments SPB-A Board

#### Strap Locations SPB-A Board



### 15.8.5. Installation / Maintenance SPB-A Board

The SPB-A Board may be installed in either the PC/XT or AT Option Slots. If installing a second I/O board take care that this board is using other interrupts and port addresses than the first installed board.

The name of the serial or parallel port, as used by MS-DOS, is related to the selected I/O address. Refer to subsection 15.1.4. for names used by MS-DOS.



## **15.9. ICP BOARD**

### **15.9.1. Characteristics ICP Board**

The ICP board is the "Intelligent Communication Processor" used as general purpose communication controller, providing connections to SNA networks and to public data networks (X.21, X25). The ICP is based on the 80186 microprocessor, and equipped with a Zilog Z8530 Communication Controller with two independent communication channels supporting V.24 (additional for Channel A, X.21) DTE operating modes. With special Adaptor Cables also DCE is supported. Up to four ICP-Boards may be installed in to allow Gate-way configurations or Stand-alone configurations.



## 15.9.2. Connections ICP Board

RS-232-C / V.24 Interface

DTE Interface with special adaptor cable installed. (Refer to chapter 2.).

PIN	SIGNAL NAME	PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	Common Ground	10		19	DRSI
2	TxD	11		20	DTR
3	RxD	12		21	RLOOP
4	RTS	13		22	RI
5	CTS	14	DTE ENABLE	23	DRSO / DRSI
6	DSR	15	TxC (from DCE)	24	TxC (to DCE)
7	Common Ground	16	Common Ground	25	TI
8	DCD	17	RxC (from DCE)	26	V.24 ENABLE
9	RR	18	LLOOP		

Interface Connector J3 (Channel A)

PIN	SIGNAL NAME	PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	Common Ground	10	N.C.	19	DRSI
2	TxD	11	N.C.	20	DTR
3	RxD	12	N.C.	21	RLOOP
4	RTS	13		22	RI
5	CTS	14	DTE ENABLE	23	DRSO / DRSI
6	DSR	15	TxC (from DCE)	24	TxC (to DCE)
7	Common Ground	16	Common Ground	25	TI
8	DCD	17	RxC (from DCE)	26	V.24 ENABLE
9	RR	18	LLOOP		

Interface Connector J2 (Channel B)

PIN	SIGNAL NAME	PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	Common Ground	10		19	DRSO
2	RxD	11		20	DSR
3	TxD	12		21	TI
4	CTS	13	TxC (to DTE)	22	LLOOP
5	RTS	14	DTE ENABLE	23	DRSO / DRSI
6	DTR	15		24	RxC (to DTE)
7	Common Ground	16	Common Ground	25	RLOOP
8	RR	17	TxC (from DTE)	26	V.24 ENABLE
9	DCD	18	RI		

Interface Connector J3 (Channel A)

PIN	SIGNAL NAME	PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	Common Ground	10	N.C.	19	DRSO
2	RxD	11	N.C.	20	DSR
3	TxD	12	N.C.	21	TI
4	CTS	13	TxC (to DTE)	22	LLOOP
5	RTS	14	DTE ENABLE	23	DRSO / DRSI
6	DTR	15		24	RxC (to DTE)
7	Common Ground	16	Common Ground	25	RLOOP
8	RR	17	TxC (from DTE)	26	V.24 ENABLE
9	DCD	18	RI		

Interface Connector J2 (Channel B)

X.21

DTE interface with special adaptor cable installed. (Refer to chapter 2.).

PIN	SIGNAL NAME	PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	PROTECT. GND	10	R(A)	19	
2		11	I(A)	20	
3	R(B)	12	S(A)	21	
4		13		22	S(B)
5	I(B)	14	DTE ENABLE	23	
6		15	T(A)	24	
7	SIGNAL GND	16	CONNECT. GND	25	C(B)
8	T(B)	17	C(A)	26	V.24 ENABLE
9		18			

Interface Connector J3 (Channel A).

X.21

DCE interface with special adaptor cable installed. (Refer to chapter 2.).

PIN	SIGNAL NAME	PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	PROTECT. GND	10	T(A)	19	
2		11	C(A)	20	
3	T(B)	12	S(A)	21	
4		13		22	
5	C(B)	14	DTE ENABLE	23	
6	S(B)	15	R(A)	24	
7	SIGNAL GND	16	CONNECT. GND	25	I(B)
8	R(B)	17	I(A)	26	V.24 ENABLE
9		18			

Interface Connector J3 (Channel A).

### 15.9.3. Strap Settings / Adjustments ICP Board

(RS-232-C/V.24 with DTE adaptor cable)

STRAP CHANNEL A (J3)	STRAP CHANNEL B (J2)	POSITION	FUNCTION
W10	W9	IN OUT	Transmit Clock In (114) Transmit Clock Out (113)
W7	W11	IN	Receive Clock In
W6	W12	B-C A-B	Data Rate Select Out Data Rate Select In
W8	W13	IN	Common Ground

**Note:** Pins 14, 16 and 26 of the connector are tied together to select RS-232-C/V.24 DTE

(RS-232-C/V.24 with DCE adaptor cable)

STRAP SETTING CHANNEL A CONNECTOR (J3)	STRAP SETTING CHANNEL B CONNECTOR (J2)	PIN	FUNCTION
W10	W9	OUT	Receive Clock In (115)
W7	W11	OUT IN	Transmit Clock In (114) Transmit Clock Out (113)
W6	W12	B-C A-B	Data Rate Select In Data Rate Select Out
W8	W13	IN	Common Ground

**Note:** Pins 16 and 26 of the connector are tied together to select RS-232-C/V.24 DCE

(X.21 DTE)

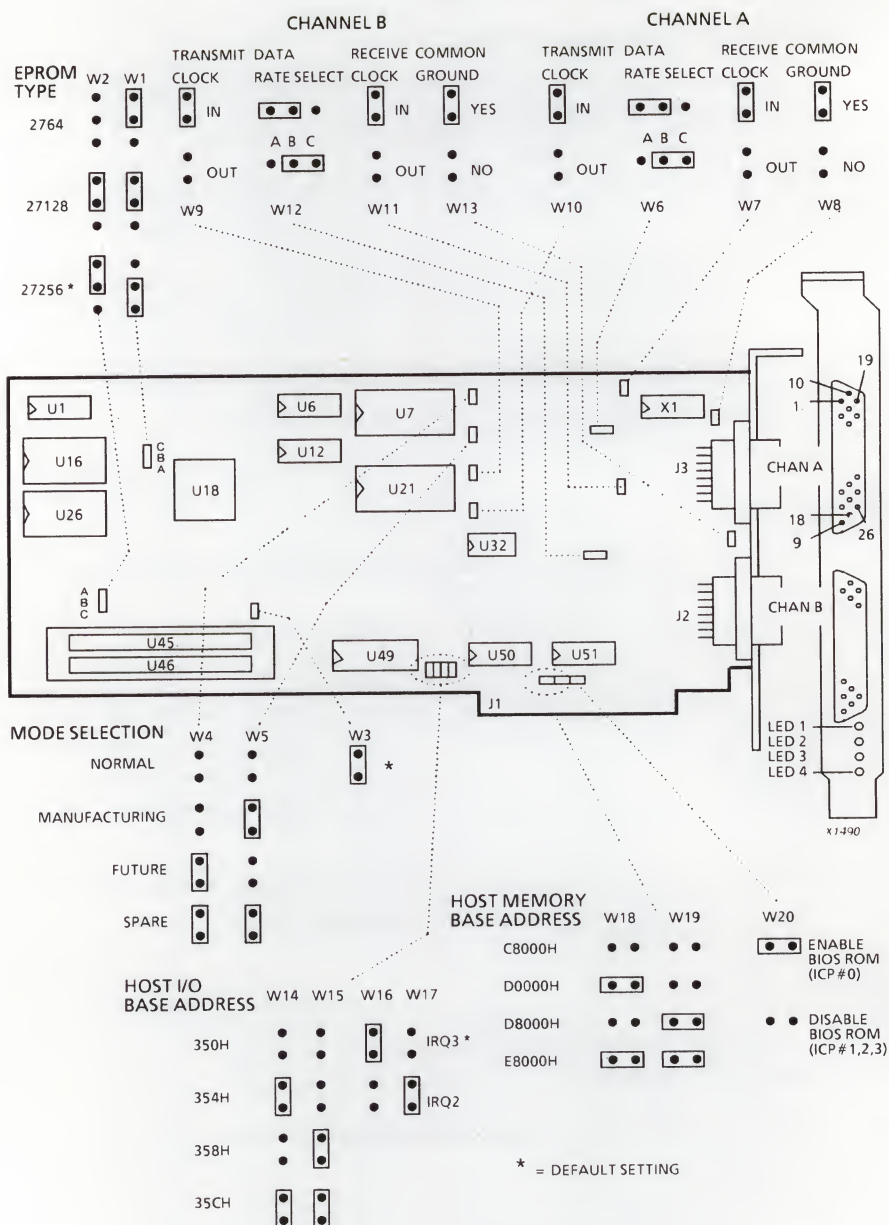
Strap: W8 IN (Protective GND)  
W7 IN (Signal Element Timing)  
Jumper block: X1 Installed

**Note:** Pins 14 and 16 of the connector are tied together to select X21 DTE

(X.21 DCE)

Strap: W8 IN (Protective GND)  
Jumper block: X1 Installed





#### 15.9.4. Modification History ICP Board

Assembly Level Reference Tabel

12NC	ICP GATEWAY								
	ROM U16	ROM U26	ROM U49	PAL U1	PAL U6	PAL U12	PAL U32	PAL U50	PAL U51
15711	70931	70921	73001	70971	70981	70961	70991	70951	70941
15712	70931	70921	73001	70971	70981	70961	70991	70951	70941

The above 12 NC numbers start with 5107 265 xxxxx

12NC	ICP OEM								
	ROM U16	ROM U26	ROM U49	PAL U1	PAL U6	PAL U12	PAL U32	PAL U50	PAL U51
15611	73001	73021	73001	70971	70981	70961	70991	70951	70941
15612	73001	73021	73002	70971	70981	70961	70991	70951	70941
15613	73012	73022	73002	70971	70981	70961	70993	70951	70941

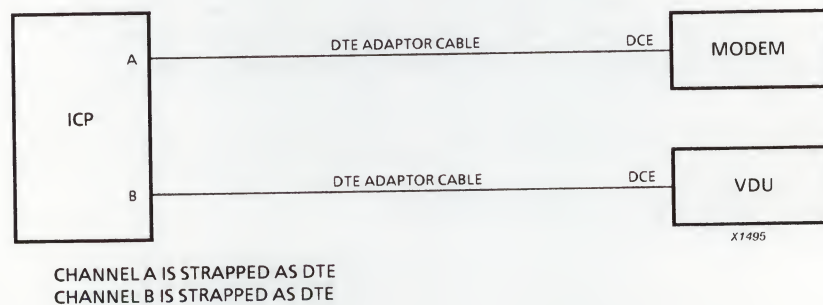
The above 12 NC numbers start with 5107 265 xxxxx

### 15.9.5. Installation / Maintenance ICP Board

The ICP Board may be installed in any of the option board slots on the main PCB. When installing this board, check that the heatsink on the ICP CPU (U18) does not interfere with an adjacent board, possibly causing a short circuit. The strap settings should be checked. Ensure that there is no conflict in board address or interrupts used with any other options installed. Up to four ICPs may be installed. If more than one ICP is installed, the following rules must be followed.

- For all the ICPs mapped to the same host address space, only one of them must have its COMM-BIOS PROM enabled.
- For all the ICPs mapped at different host address spaces, there must be one ICP for each address space with its COMM-BIOS PROM enabled.
- All the ICPs must be configured for different I/O addresses.

Power on the system and check that there are no error messages displayed by the power on self test performed by the ICP Board (refer to 15.9.6.). Turn off system power and install the 26 pin cable .



### 15.9.6. Diagnostic Functions ICP Board

#### LED Output

Refer to section 15.9.3 for LED locations. When the ICP receives a hardware reset LED 1 will be lit. In case of an error LED1 is flashing.  
LED 2 until 4 provide information to the user on how the user has attached the adaptor cables.

LED 4	LED 3	LED 2	Channel	Function
OFF			B	DCE adaptor cable, or no adaptor cable
ON			B	DTE adaptor cable
	OFF	OFF	A	X.21 DCE adaptor cable, or no adaptor cable
	OFF	ON	A	X.21 DTE adaptor cable
	ON	OFF	A	V.24 DCE adaptor cable
	ON	ON	A	V.24 DTE adaptor cable

#### Diagnostics

ICP firmware diagnostics has three modes of operation which are selected via the two diagnostics jumpers (W4 & W5).

W4	W5	Mode
OFF	OFF	Normal Mode
OFF	ON	Service / Manufacturing Mode
ON	OFF	Future Expansion Mode
ON	ON	Spare

The following sections will describe the various modes in detail.

##### 1. Normal Mode:

Tests will be executed on all parts of the hardware of the ICP at system start up. If no error, the diagnostics will pass control to IPL, both on COMM-BIOS and adapter PROMs.

For each ICP the following information is displayed.

1. Shared RAM address
2. I/O base address
3. Used Interrupt line
4. Pass / Fail status



Should a fault be detected, a hexadecimal error code is displayed on the screen and on diagnostic LED1. The error code on LED1 is displayed via long and short periods of LED ON cycles. ("0" is short LED ON, "1" is long LED ON). The error code is repeatedly displayed, with pauses between each complete sequence.

If a fatal error is detected, LED1 starts flashing ON and OFF continuously.  
Causes for fatal error:

- Adapter PROM checksum error
- RAM test failure: first 1k of ICP RAM, first 256 bytes of shared RAM
- Failures to detect refresh requests from the Host bus.

CODE	MEANING
02	Reset / Status port error
04	Host received a spurious interrupt on IRQ2 or IRQ3
05	ICP failed to respond at the end of a test
06	Control port Error
08	ICP did not become ready to receive commands
09	ICP command out of range
0A	ICP did not get NMI during parity test
0B	ICP received a spurious interrupt
0C	Host cannot access the shared RAM
10	ICP RAM data error, even bank
11	ICP RAM data error, odd bank
12	ICP RAM address error, even bank
13	ICP RAM address error, odd bank
14	ICP parity RAM error
15	ICP data bus error
20	Shared memory arbitration error, from the host side
21	Shared memory arbitration error, from the ICP side
30	ICP to host interrupt 1 error
31	Host to ICP interrupt error
32	ICP to host interrupt 2 error
40	ICP CPU internal timer error
50	SCC internal registers write/read error
51	SCC Channel B asynchronous test Rx interrupt error
52	SCC Channel B asynchronous test Tx interrupt error
53	SCC Channel B asynchronous test Tx . Rx data do not match
54	SCC Channel B asynchronous test framing ' parity ' overrun error

PROM Based Diagnostic Error Codes (To be continued)

CODE	MEANING
55	SCC Channel A SDLC (polling) Tx / Rx data do not match
56	SCC Channel A SDLC (polling) no Rx data or Tx not ready
57	SCC Channel A SDLC (polling) CRC error
58	SCC Channel A SDLC (polling) end of frame not detected
59	SCC Channel A SDLC (polling) Rx overrun error
5A	SCC Channel A SDLC (DMA) Tx/ Rx data do not match
5B	SCC Channel A SDLC (DMA) overrun error
5C	SCC Channel A SDLC (DMA) CRC error
5D	SCC Channel A SDLC (DMA) end of frame not detected
60	CIO internal registers write / read error
61	CIO counter / timer interrupt not generated
62	CIO counter / timer interrupt missed
63	CIO counter / timer interrupt priority error
65	Spurious CIO interrupt
66	CIO counter / timer error interrupt detected.

PROM Based Diagnostic Error Codes

## 2. Service / Manufacturing Mode:

In this mode the diagnostics will continuously execute on all the ICPs that have not reported any failure.

If ICPs have been mapped to different host address spaces, ICPs at higher address mappings can only execute their diagnostics when an ICP on a lower address range has detected an error. The same information is displayed as in Normal Mode.

## 3. Future Expansion Mode:

This mode is used together with the floppy based diagnostics (ICPDIAG.EXE).

At power-on, no diagnostics are performed. The floppy based diagnostics will execute the on-board (ICP) diagnostic routines, and it also tests the ICP communication abilities with external loopback connectors.

To run this program you have to type the following command:

```
ICPDIAG ppp ssss i
      ppp = I/O base address (350, 354, 358, 35C)
      ssss = shared memory address (C800, D000, D800, E800)
      i    = interrupt line (2,3)
```

The above values must correspond to those selected on the ICP board via the appropriate jumpers.

After entering, e.g. ICPDIAG 350 C800 3 <Return>, the main selection menu (shown below) will appear. **Both** loopback connectors should be present during the tests.

```
PHILIPS ICP Diagnostics      Ver 2.0      88-09-029      8706 008 03212
Copyright 1987, 1988, Philips Electronics Ltd.

*** Waiting for input ***

<F1>  Run Diagnostics.
<F2>  Run Diagnostics With Error Count.
<F3>  Reset ICP Card.
<F10> Exit to DOS

Select class of tests
```

The selectable test modes are called by pressing F2 or F3 (With Error Count) from the main menu. A new menu appears from where individual tests can be started by pressing the appropriate letter keys. The testing is started when the enter key is pressed. The tests continue until the <END> key is pressed.

```
PHILIPS ICP Diagnostics      Ver 2.0      88-09-029      8706 008 03212
Copyright 1987, 1988, Philips Electronics Ltd.

ICP at address C800, I/O 350, IRQ 3

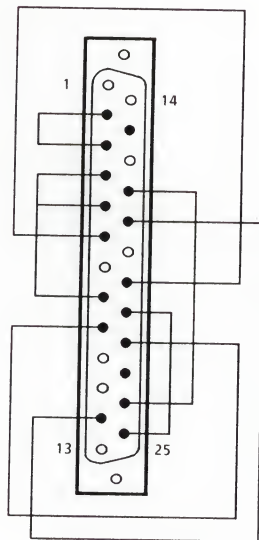
*** Waiting For Input ***
a) 0000 Host - ICP interface:
b) 0000 Shared RAM arbitration:
c) 0000 80186 timer:
d) 0000 Memory:
e) 0000 CIO:
f) 0000 SCC:
g) 0000 DMA:
h) 0000 ICP to host interrupt:
i) 0000 Host to ICP interrupt:
j) 0000 Parity detect & NMI:
k) 0000 SCC (with loopback):
l) 0000 System Integrity:

- Select test(s) & hit <CR>. Hit <ESC> to clear all tests
- <HOME> returns to main menu. Select all tests by hitting "z".
```

# V.24 DTE Loopback Connectors:

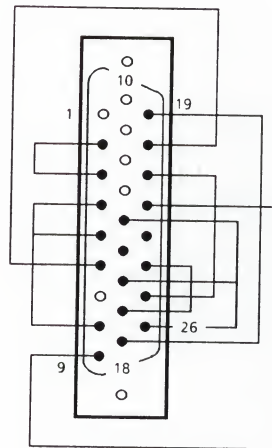
2 - 3 TXD - RXD  
 4 - 5 RTS - CTS  
 5 - 8 CTS - DCD  
 6 - 20 DSR - DTR  
 9 - 22 RR - CIN  
 17 - 24 RXC - TXC  
 18 - 12 LLOOP - DSRI  
 21 - 25 RLOOP - TI

2 - 3 TXD - RXD  
 4 - 5 RTS - CTS  
 5 - 8 CTS - DCD  
 6 - 20 DSR - DTR  
 9 - 22 RR - CIN  
 17 - 24 RXC - TXC  
 18 - 19 LLOOP - DSRI  
 21 - 25 RLOOP - TI  
 14 - 16 DTE-ENABLE - COMMON GND  
 16 - 26 COMMON GND - V.24 ENABLE



25-PIN MALE

USED TOGETHER WITH  
 V.24 DTE ADAPTOR CABLE



26-PIN MALE

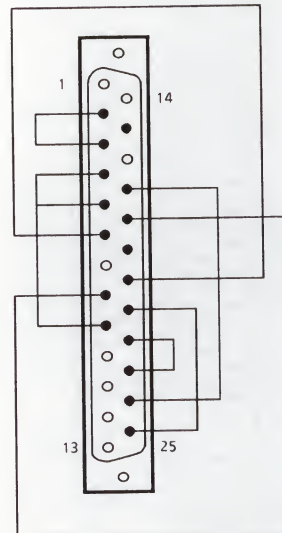
X4755



# V.24 DCE Loopback Connectors:

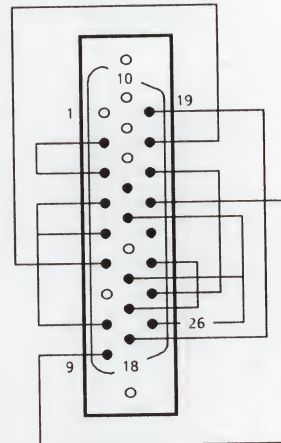
2 - 3 TXD - RXD  
 4 - 5 RTS - CTS  
 4 - 9 CTS - DCD  
 6 - 20 DSR - DTR  
 8 - 18 RR - CIN  
 17 - 24 RXC - TXC  
 22 - 23 LLOOP - DSRI  
 21 - 25 RLOOP - TI

2 - 3 TXD - RXD  
 4 - 5 RTS - CTS  
 5 - 8 CTS - DCD  
 6 - 20 DSR - DTR  
 9 - 22 RR - CIN  
 17 - 24 RXC - TXC  
 18 - 19 LLOOP - DSRI  
 21 - 25 RLOOP - TI  
 16 - 26 COMMON GND - V.24 ENABLE



25-PIN MALE

USED TOGETHER WITH  
 V.24 DCE ADAPTOR CABLE



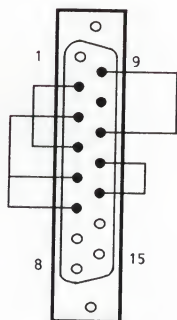
26-PIN MALE

X4756

# X.21 DTE Loopback Connectors:

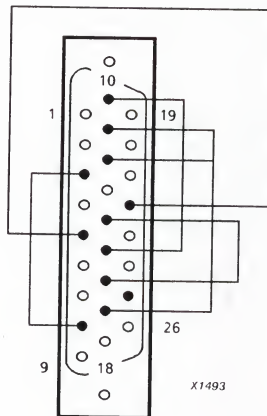
11 - 9 R(B) - T(B)  
 12 - 13 I(B) - S(B)  
 4 - 2 R(A) - T(A)  
 5 - 6 I(A) - S(A)  
 6 - 3 S(A) - C(A)

3 - 8 R(B) - T(B)  
 5 - 22 I(B) - S(B)  
 10 - 15 R(A) - T(A)  
 11 - 12 I(A) - S(A)  
 12 - 17 S(A) - C(A)  
 14 - 16 DTE-ENABLE - COMMON GND



15-PIN MALE

USED TOGETHER WITH  
 X.21 DTE ADAPTOR CABLE

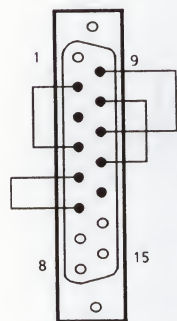


26-PIN MALE

# X.21 DCE Loopback Connectors:

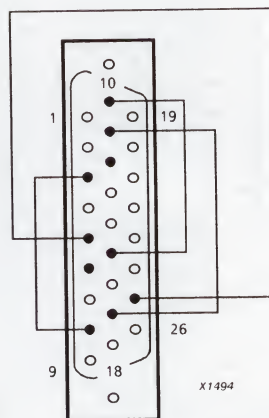
5 - 6 I(A) - C(A)  
 12 - 10 I(B) - C(B)  
 11 - 9 R(B) - T(B)  
 4 - 2 R(A) - T(A)

11 - 17 I(A) - C(A)  
 5 - 25 I(B) - C(B)  
 3 - 8 R(B) - T(B)  
 10 - 15 R(A) - T(A)



15-PIN MALE

USED TOGETHER WITH  
 X.21 DCE ADAPTOR CABLE



26-PIN MALE

## 15.10. AST FOUR PORT

### 15.10.1. Characteristics AST Four Port

The AST Four Port plugs into a PC or AT I/O slot. It provides four asynchronous channels, using a subset of the V.24 signals.

The board can be configured in two modes:

- Compatible mode. (I/O addresses as used by MS-DOS)  
Channels 1 and 2 operate as standard serial ports. Refer to section 51.1.5. for names used by MS-DOS.
- Enhanced mode.  
The serial ports as known by MS-DOS may coexist but are not on this board.

The board has one 37 pin D connector. To use the channels the splitter cable delivered with the board can be used. This cable distributes the signals over four 25 pin D connectors, one connector for each channel.

### 15.10.2. Connections AST Four Port

Serial Port Connector J1 (37-PIN Male)

PIN	CH.	SIGNAL NAME	PIN	CH.	SIGNAL NAME
1		SHIELD	20	3	RI (I)
2	3	DCD (I)	21	3	DTR (O)
3	3	GROUND	22	3	DSR (I)
4	3	CTS (I)	23	3	RTS (O)
5	3	RXD (I)	24	3	TXD (O)
6	4	RI (I)	25	4	DCD (I)
7	4	DTR (O)	26	4	GROUND
8	4	DSR	27	4	CTS (I)
9	4	RTS (O)	28	4	RXD (I)
10	4	TXD (O)	29	2	RI (I)
11	2	DCD (I)	30	2	DTR (O)
12	2	GROUND	31	2	DSR (I)
13	2	CTS (I)	32	2	RTS (O)
14	2	RXD (I)	33	2	TXD (O)
15	1	RI (I)	34	1	DCD (I)
16	1	DTR (O)	35	1	GROUND
17	1	DSR (I)	36	1	CTS (I)
18	1	RTS (O)	37	1	RXD (I)
19	1	TXD (O)			



# AST Four Port Splitter Cable

PIN	SIGNAL NAME	D25 PIN NR.			
		J1	J2	J3	J4
1	SHIELD	1	1	1	1
2	DCD (I)			8	
3	GROUND			7	
4	CTS (I)			5	
5	RXD (I)			3	
6	RI (I)				22
7	DTR (O)				20
8	DSR (I)				6
9	RTS (O)				4
10	TXD (O)				2
11	DCD (I)		8		
12	GROUND		7		
13	CTS (I)		5		
14	RXD (I)		3		
15	RI (I)	22			
16	DTR (O)	20			
17	DSR (I)	6			
18	RTS (O)	4			
19	TXD (O)	2			

PIN	SIGNAL NAME	D25 PIN NR.			
		J1	J2	J3	J4
20	RI (I)			22	
21	DTR (O)			20	
22	DSR (I)			6	
23	RTS (O)			4	
24	TXD (O)			2	
25	DCD (I)				8
26	GROUND				7
27	CTS (I)				5
28	RXD (I)				3
29	RI (I)		22		
30	DTR (O)		20		
31	DSR (I)		6		
32	RTS (O)		4		
33	TXD (O)		2		
34	DCD (I)	8			
35	GROUND	7			
36	CTS (I)	5			
37	RXD (I)	3			

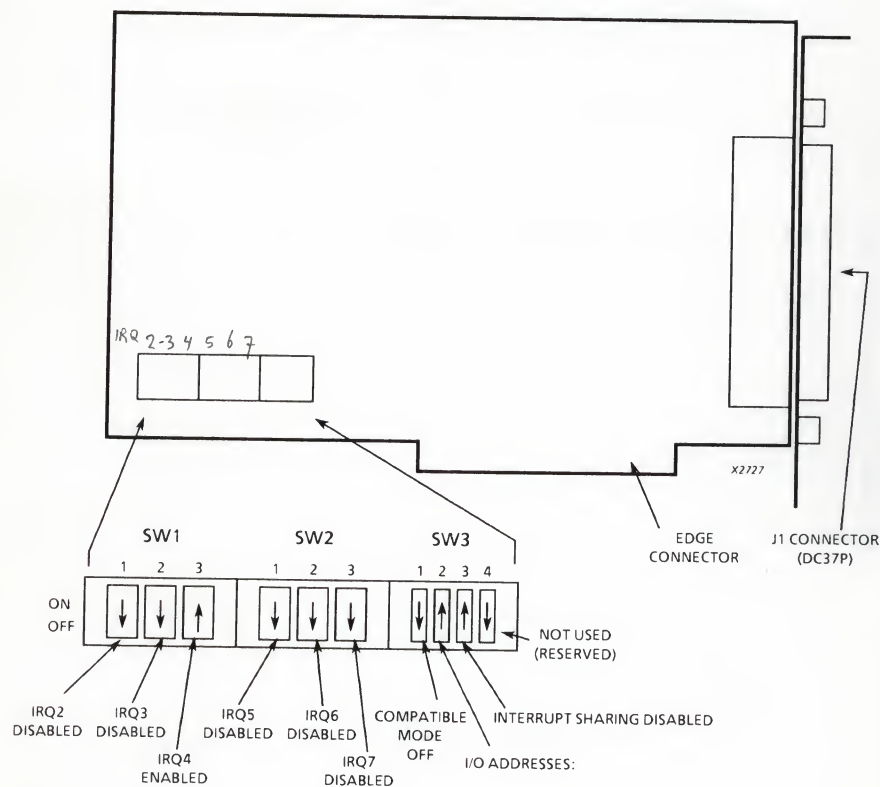
This results in the following signals on connectors J1 Thr. J4

PIN	SIGNAL NAME
1	SHIELD
2	TXD (O)
3	RXD (I)
4	RTS (O)
5	CTS (I)
6	DSR (I)
7	GROUND
8	DCD (I)
9	
10	
11	
12	
13	

PIN	SIGNAL NAME
14	
15	
16	
17	
18	
19	
20	DTR (O)
21	
22	RI (I)
23	
24	
25	

### 15.10.3. Strap Settings / Adjustments AST Four Port

#### Strap Locations



Default settings are shown.

ENHANCED MODE		I/O ADDRESSES CHANNEL 1	I/O ADDRESSES CHANNEL 2	I/O ADDRESSES CHANNEL 3	I/O ADDRESSES CHANNEL 4	I/O ADDRESS SHARED
SW3-1	SW3-2					
OFF	ON	2A0-2A7H	2A8-2AFH	2B0-2B7H	2B8-2BEH	2BFH
OFF	OFF	1A0-1A7H	1A8-1AFH	1B0-1B7H	1B8-1BEH	1BFH

COMPATIBLE MODE		I/O ADDRESSES CHANNEL 1	I/O ADDRESSES CHANNEL 2	I/O ADDRESSES CHANNEL 3	I/O ADDRESSES CHANNEL 4	I/O ADDRESSES SHARED
SW3-1	SW3-2					
ON	ON	3F8-3FFH	2F8-2FFH	2B0-2B7H	2B8-2BEH	2BFH
ON	OFF	3F8-3FFH	2F8-2FFH	1B0-1B7H	1B8-1BEH	1BFH

#### 15.10.5. Installation / Maintenance AST Four Port

This board can be plugged into one of the I/O slots of the main board. Do not insert it in the first slot, because of the space needed for the splitter cable.

### 15.10.6. Diagnostic Functions AST Four Port

#### XENIX:

For testing the AST Four Port Controller the program XQDIAG, delivered with the board, can be used. This testprogram runs under Xenix.

Before the testprogram can be used, it should be copied from the AST flexible disk to the customer hard disk. To do this, insert the flexible disk into the first flexible disk drive. Then execute the following commands:

```
cd /usr/bin
tar x xqdiag
```

The diagnostic program has now been copied into the directory */usr/bin* and can be started by typing the command *xqdiag*. Before testing, the channel to be tested should be disabled using the following command :

```
disable /dev/tty1b
```

After testing the channel can be enabled again using: *enable /dev/tty1b*.

After starting the program the following menu then appears:

```
#xqdiag
      Async Cluster Adapter XQDIAG Diagnostic Version x.xx
      (c) AST Research, 1985, 1986

      Test 1:  internal loop-back
      Test 2:  external loop-back
      Test 3:  terminal output
      Test 4:  keyboard echo
      0:      quit diagnostics

      Enter test number: 1

      Enter device pathname: /dev/tty1b

      Enter loop count (default is 1): 1

      Test 1: Internal loopback
      PASSED
```



**Test1:** This test checks if XENIX can open the device and pass data to and from it. It uses a loopback inside the communication controllers, loopback connectors are required. This test last approximately 20 seconds. The test will fail if:

- The user running the diagnostic does not have sufficient access rights to the device.
- A login has been enabled on that device.
- The dip-switch settings on the AST board are incorrect.
- The adapter is faulty.

**Test2:** This test is similar to test1. It also checks the V24 drivers. A loopback connector must be installed on the splitter cable connector of the channel that has to be tested (J1..J4). The test fails for the same conditions as test1.

For the testconnector use a female 25 pin D-connector and interconnect the following pins :

2 - 3  
4 - 5 - 8  
6 - 20 - 22

**Test3:** This test outputs a shifting pattern to the terminal. It can be used to test terminal connection and set-up.

**Test4:** This test reads characters from the keyboard and displays the character and the hexadecimal ASCII code for each character.

## **15.11. NP500 LAN CONTROLLER**

### **15.11.1. Characteristics NP500 LAN Controller**

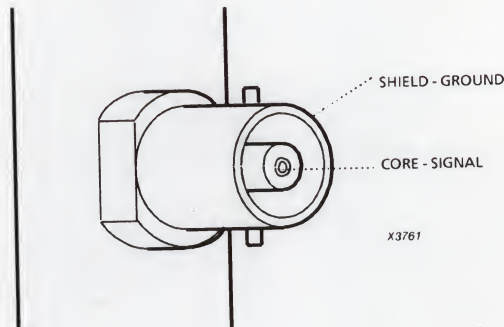
The NP500 LAN Controller is an intelligent Ethernet Controller, that allows you to communicate with other devices over an Ethernet Local Area Network. The NP500 is fully compatible with standard Ethernet (IEEE 802.3 10BASE5) networks and Thin Ethernet (Cheapernet) (IEEE 802.3 10BASE2) networks. The NP500 is based on the 80186 microprocessor, and equipped with an 82586 LAN Coprocessor.

### 15.11.2. Connections NP500 LAN Controller

10BASE5 IEEE 802.3 Connector J2 (15-PIN Female)

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	Shield	9	Collision Precece -
2	Collision Precece +	10	Transmit -
3	Transmit +	11	Shield (Transmit)
4	Shield (Receive)	12	Receive -
5	Receive +	13	Power +12V
6	Power return	14	Shield (Voltage)
7	Reserved	15	Reserved
8	Reserved		

10BASE2 IEEE 802.3 Connector J3

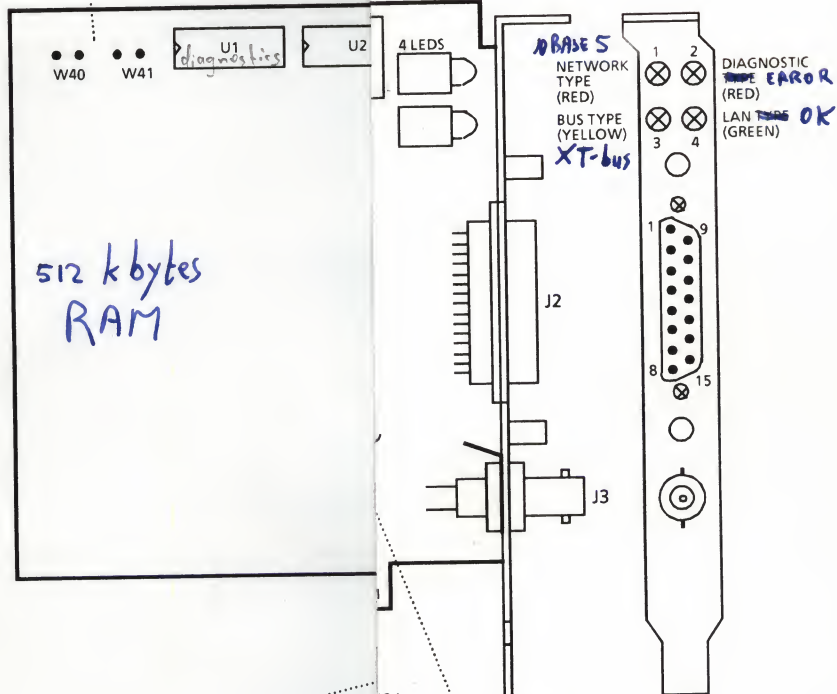


# 15.11.3. Strap Settings / Adjustme

JUMPER

HARDWARE REVISION  
CONTROL STRAPS

SETTING FOR  
STANDARD  
ETHERNET  
IOBASES



CLOCK DELAY FOR  
ARBITRATION PAL

SELECT 30ns DELAY \*  
FOR 8 MHz CLOCK

W13

SELECT 20ns DELAY  
FOR 10/12 MHz CLOCK

NOTE: \* INDICATES DEFAULT

IRQ JUMPERS

W8 9 10 11 12

IRQ 3 5 9 11 15 dec.  
B F hex.

Bij CS in AT: IRQ 9 ::D::

Bij ontwikkeling: IRQ 11 ::D:: (-IB)  
en in 386

NP500drv -v -b310 -d7 -ib



ADDRESS	W14	W15	W16	W17	W18	W19
200H	0	0	0	0	0	1
210H	1	0	0	0	0	1
220H	0	1	0	0	0	1
230H	1	1	0	0	0	1
240H	0	0	1	0	0	1
250H	1	0	1	0	0	1
260H	0	1	1	0	0	1
270H	1	1	1	0	0	1
280H	0	0	0	1	0	1
290H	1	0	0	1	0	1
2A0H	0	1	0	1	0	1
2B0H	1	1	0	1	0	1
2C0H	0	0	1	1	0	1
2D0H	1	0	1	1	0	1
2E0H	0	1	1	1	0	1
2F0H	1	1	1	1	0	1
300H	0	0	0	0	1	1
310H	1	0	0	0	1	1
320H	0	1	0	0	1	1
330H	1	1	0	0	1	1
340H	0	0	1	0	1	1
350H	1	0	1	0	1	1
360H	0	1	1	0	1	1
370H	1	1	1	0	1	1
380H	0	0	0	1	1	1
390H	1	0	0	1	1	1
3A0H	0	1	0	1	1	1
3B0H	1	1	0	1	1	1
3C0H	0	0	1	1	1	1
3D0H	1	0	1	1	1	1
3E0H	0	1	1	1	1	1
3F0H	1	1	1	1	1	1

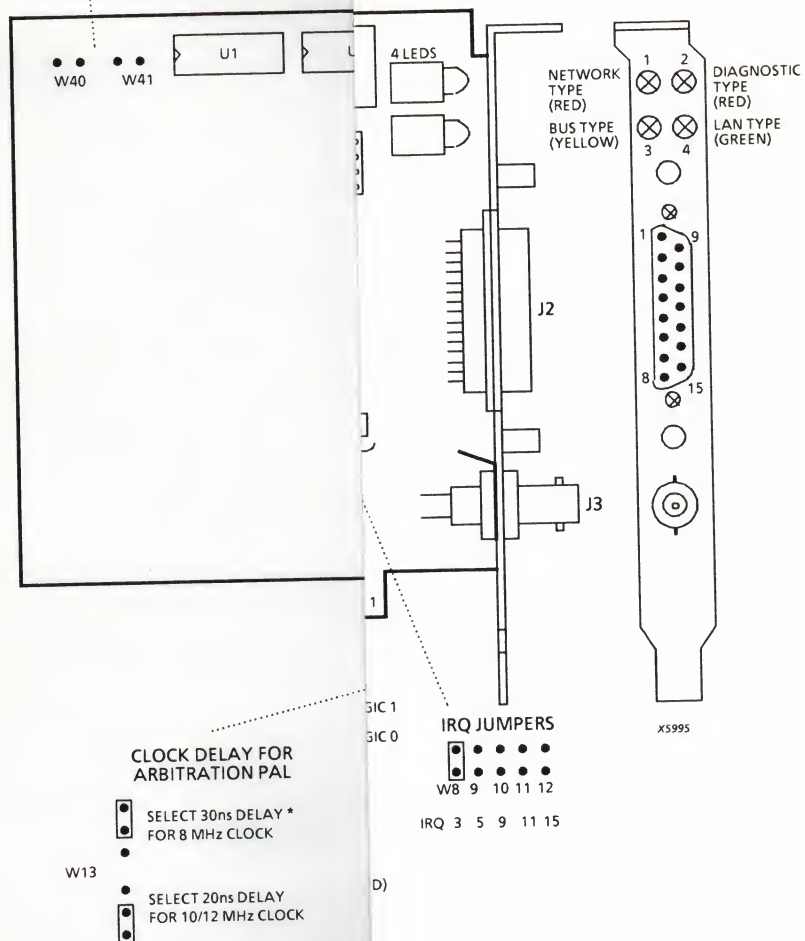
Host I/O Base Addresses

ADDRESS	W28	W29	W30
C0000H	0	0	0
C8000H	0	0	1
D0000H	0	1	0
D8000H	0	1	1
E0000H	1	0	0
E8000H	1	0	1

Boot PROM Host Base  
Addresses

### 15.11.3. Strap Settings / Adjustme

HARDWARE REVISION  
CONTROL STRAPS



CLOCK DELAY FOR  
ARBITRATION PAL

SELECT 30ns DELAY \*  
FOR 8 MHz CLOCK

W13

SELECT 20ns DELAY  
FOR 10/12 MHz CLOCK

NOTE: \* INDICATES DEFAULT

ADDRESS	W14	W15	W16	W17	W18	W19
200H	0	0	0	0	0	1
210H	1	0	0	0	0	1
220H	0	1	0	0	0	1
230H	1	1	0	0	0	1
240H	0	0	1	0	0	1
250H	1	0	1	0	0	1
260H	0	1	1	0	0	1
270H	1	1	1	0	0	1
280H	0	0	0	1	0	1
290H	1	0	0	1	0	1
2A0H	0	1	0	1	0	1
2B0H	1	1	0	1	0	1
2C0H	0	0	1	1	0	1
2D0H	1	0	1	1	0	1
2E0H	0	1	1	1	0	1
2F0H	1	1	1	1	0	1
300H	0	0	0	0	1	1
310H	1	0	0	0	1	1
320H	0	1	0	0	1	1
330H	1	1	0	0	1	1
340H	0	0	1	0	1	1
350H	1	0	1	0	1	1
360H	0	1	1	0	1	1
370H	1	1	1	0	1	1
380H	0	0	0	1	1	1
390H	1	0	0	1	1	1
3A0H	0	1	0	1	1	1
3B0H	1	1	0	1	1	1
3C0H	0	0	1	1	1	1
3D0H	1	0	1	1	1	1
3E0H	0	1	1	1	1	1
3F0H	1	1	1	1	1	1

Host I/O Base Addresses

ADDRESS	W28	W29	W30
C0000H	0	0	0
C8000H	0	0	1
D0000H	0	1	0
D8000H	0	1	1
E0000H	1	0	0
E8000H	1	0	1

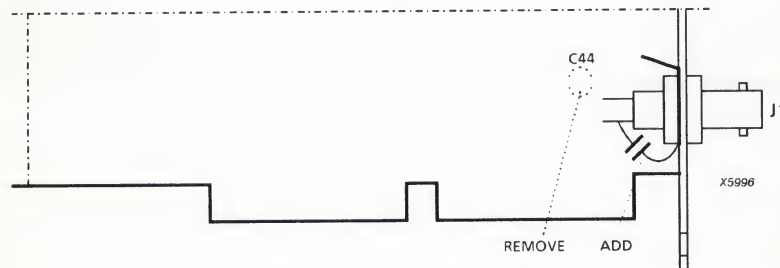
Boot PROM Host Base  
Addresses

#### 15.11.4. Modification History NP500 LAN Controller

TYPE NUMBER	SOCKET	REVISION LEVEL		
		XK	BX	CX
See note <i>diagnostics</i>	U1	-	-	-
PAL 258-0103-00	U2	XA	AA	AA
EPROM 258-0094-00	U3	XA	AB	AB
PAL 258-0096-00	U4	XA	AA	AA
PAL 258-0093-00	U13	XA	AA	AA
PAL 258-0130-00	U16	XD	AA	AA
EPROM 258-0095-00	U20	XA	AB	AB
PAL 258-0099-00	U24	XB	AA	AA
See note <i>Boot Prom</i>	U29	-	-	-
PAL 258-0097-00	U30	XA	AA	AA
PAL 258-0159-00	U34	XA	AA	AA
PAL 258-0098-00	U48	XA	AA	AA
PAL 258-0145-00	U49	XC	AA	AA
PAL 258-0100-00	U62	XA	AA	AA
PAL 258-0101-00	U63	XA	AA	AA
PAL 258-0102-00	U69	XB	AA	AA

**NOTE:** Socket U1 is reserved for the connection of a serial communication device allowing communication between a terminal and the NP500 for debug and development purposes only. Socket U29 is reserved for a boot EPROM.

Capacitor C44 must be changed to meet the FTZ class A limits. Remove the old C44 (on XK or BX boards). Install a 1.5 nF capacitor directly between the nut used to connect the coax connector to the PC metal bracket and the coax shield pin of the connector. See next figure.



CX level boards do not need this modification, because they are already FTZ approved.



### 15.11.5. Installation / Maintenance NP500 LAN Controller

The NP500 may be installed in any of the option board slots. In an AT-type PC you should select a 16-bit slot if one is available. Put the straps in the desired positions. Ensure that there is no conflict in board addresses, interrupts or DMA channels used with any other options installed. Power on the system and check the LEDs (refer to section 15.11.6.). Run the NP500 diagnostic program (NP500DG.EXE) to confirm you have installed the board correctly. Set up AUTOEXEC.BAT to install the "Philips ISO Protocols & NetBIOS", each time you boot your PC:

1. Copy all the files from the diskette labeled "Philips ISO Protocols & NetBIOS" to any directory.

Programs: NP500DRV.EXE (installs NP500LDR, and loads NetBIOS and transport protocol resident in memory)  
NP500LDR.EXE (installs NP500BRD)  
NP500BRD.EXE (binary file downloaded by NP500LDR)  
NP500DG.EXE (diagnostic program)

Help file : READ.ME

2. Use an editor, e.g. EDLIN to update AUTOEXEC.BAT file:

```
NP500DRV -bxxx -iy -dz [-v]
```

where:    xxx    =    I/O base address.  
         y       =    Interrupt request level.  
         z       =    DMA channel.  
         v       =    Verbose option (information is displayed during power up).

For example NP500DRV -b360 -i3 -d7 would install all of the required files on a NP500 that was strapped for I/O base address 360, Interrupt level 3, DMA channel 7. This data and the NP500's unique Ethernet number is reported each time you boot the PC.

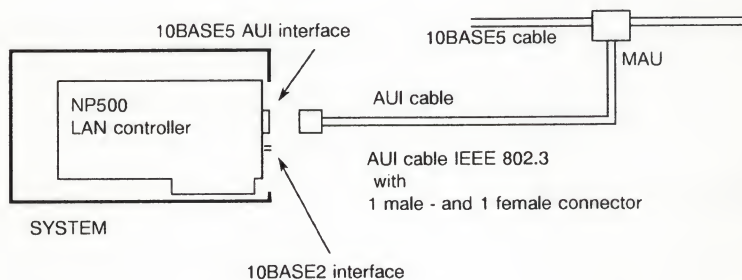
#### P3202

Some timing problems with NP500/P3202 can be solved by inserting a PAL (12NC : 5107 299 67651) at position U70 on the main PCB. Strap U11 must be inserted to enable the PAL on the main PCB.

## 10BASE5 Networks

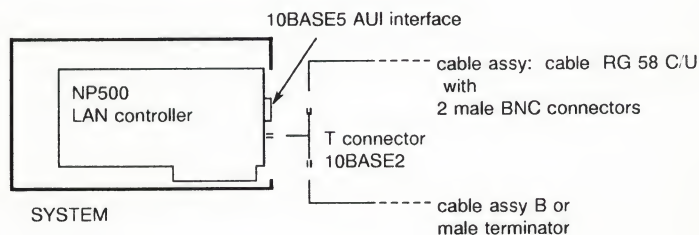
The NP500 operates correctly only with Medium Attachment Units (MAU's) that are compatible with IEEE 802.3 and / or Ethernet V2.0 specifications. To minimize interfering with other systems, the NP500's MAU should be at a mark on the cable which is a multiple of 2.5 metres (e.g. 2.5, 5.0 or 7.5 metres etc.) from the transceiver adjacent to it. The NP500 is connected with a standard AUI cable (max. 50 metres, with female and male D-connectors) to the MAU.

The NP500 comes with a slide latch adapter plate, two screws and two clips. The AUI cable is latched with the adapter plate. The AUI cable is connected to a MAU. The MAU must be placed at a distance which is a multiple of 2.5 metres from an adjacent MAU and on a mark on the 10BASE5 cable.



## 10BASE2 Networks

The NP500 is connected with a BNC T-connector to the network. When the PC is the last or first one on the network, one end of the T-connector should be terminated with a 50-ohm BNC terminator. The shield of the cables in a network should be grounded at only one point. The T-connector should be isolated to prevent accidental connection to ground.



### 15.11.6. Diagnostic Functions NP500 LAN Controller

#### LED Output

Refer to section 15.11.3 for LED locations. Each time the NP500 is turned on, the four LEDs reports the board's basic hardware status.

LED 4 <i>lan ok</i>	LED 3 <i>XT</i>	LED 2 <i>diagn</i>	LED 1 <i>10base5</i>	FUNCTION
ON OFF				LAN OK LED (green) On-board diagnostics completed successfully Error
	ON OFF			Bus Type LED (yellow) NP500 is installed in an 8-bit expansion slot NP500 is installed in an 16-bit expansion slot
		ON OFF		Diagnostic LED (red) On-board diagnostics detects a problem No problem detected
			ON OFF	Network Type LED (red) NP500 is strapped for a 10BASE5 network NP500 is strapped for a 10BASE2 network

#### Diagnostic Program

Type NP500DG <RETURN> to run the diagnostic program. A Diagnostic Configuration Menu will appear on the screen. Check if the Current Configuration equals the settings on the NP500. Use the cursor keys to select "No" when the straps are not factory configured (Base Addr.: 360, DMA Ch.: 7, IRQ level : 3).

- Change the configuration if necessary and select the Main Menu
- Select the wanted test(s)

Full details of the complete installation procedure, along with a complete list of error codes and corrective actions are given in the NP500 Installation Manual. Refer to this manual for further details (this manual is delivered with every NP500 board).

## Possible LAN errors detected by diagnostics

code 103	No Transceiver connected or network terminators are missing.
104	Both terminators are missing. Check the segment terminators.
105	One terminator is missing. Check and replace.
106	Carrier Sense is always active. Check network type strapping.
108	Signal Quality Error (SQE, "Heart Beat") disabled in MAU. Change the strap in the MAU to enable SQE: SQE = "ON"





## **15.12. NI5210 LAN CONTROLLER**

### **15.12.1. Characteristics NI5210 LAN Controller**

The NI5210 LAN Controller is a data-link-level network expansion board, which allows communication with other devices over an Ethernet Local Area Network. The NI5210 is fully compatible with standard Ethernet (IEEE 802.3 10BASE5) networks and Thin Ethernet (Cheapernet) (IEEE 802.3 10BASE2) networks. The NI5210 is based on a 82586 LAN Coprocessor. There are two versions of this board: the NI5210 AX and the NI5210 BX (where X is the second letter of the revision level). Both revisions of the board are functionally equivalent but the board layout has been revised and as a consequence the straps and components of the BX board are in different positions from those of the AX board. Both versions of the board come in two different memory sizes:-

- NI5210-8 (8 Kbyte RAM).
- NI5210-16 (16 Kbyte RAM).

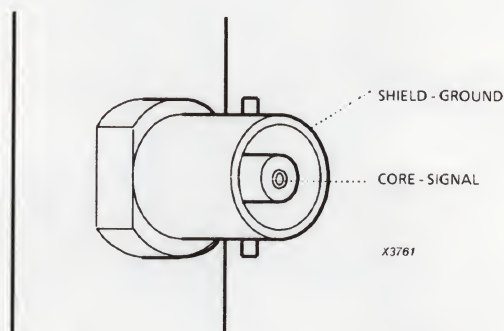
New boards (delivered by Racal) have revision level AX but the board layout of the old level BX.

## 15.12.2. Connections NI5210 LAN Controller

10BASE5 IEEE 802.3 Connector J2 (15-PIN Female)

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	Shield	9	Collision Precece -
2	Collision Precece +	10	Transmit -
3	Transmit +	11	Shield (Transmit)
4	Shield (Receive)	12	Receive -
5	Receive +	13	Power + 12V
6	Power return	14	Shield (Voltage)
7	Reserved	15	Reserved
8	Reserved		

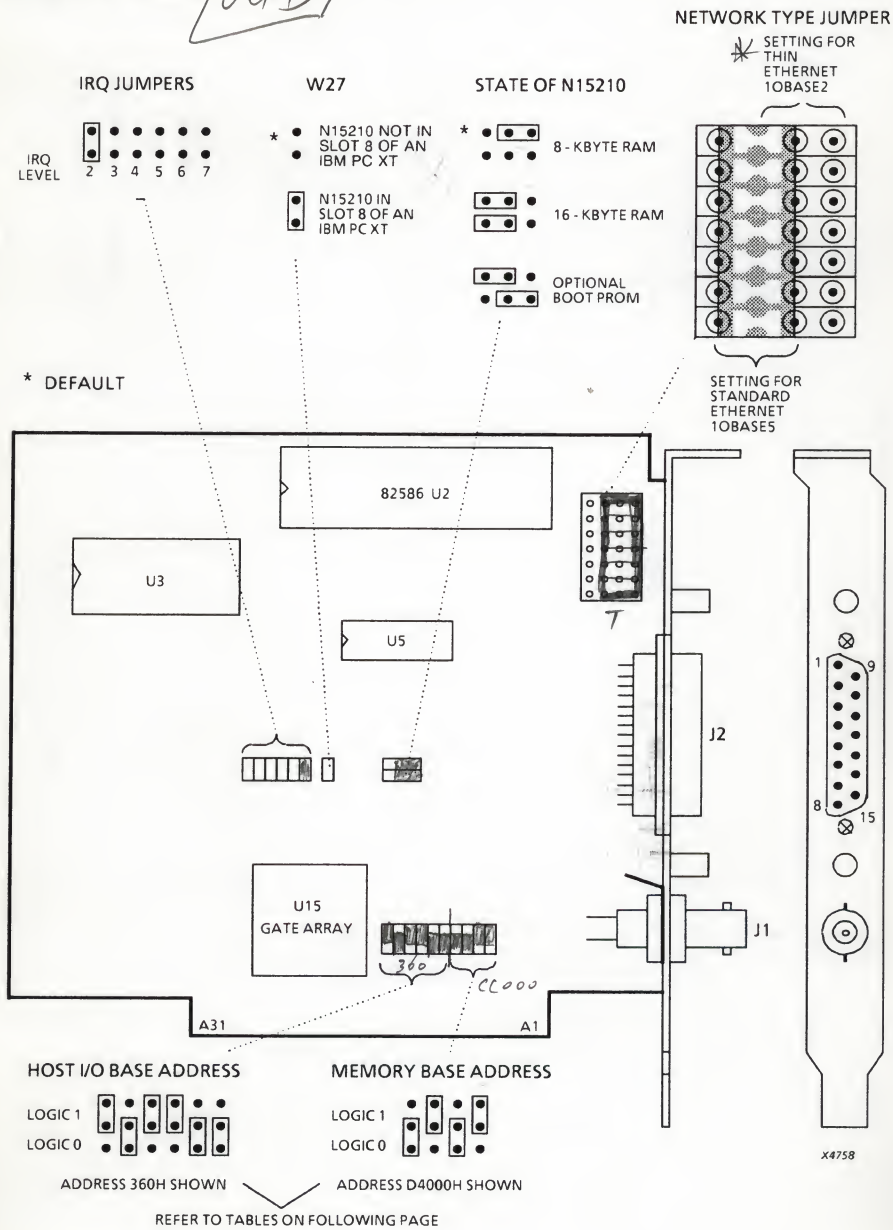
10BASE2 IEEE 802.3 Connector J1



### 15.12.3. Strap Settings / Adjustments NI5210 LAN Controller

Revision AX Board

04D





# Revision BX or Racal AX Board.

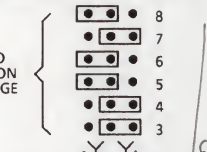
**NOTE:** ON REVISION BX OR RACAL (AX) BOARDS, THE STRAP SETTINGS FOR STANDARD AND THIN ETHERNET HAVE BEEN REVERSED FROM THOSE USED PREVIOUSLY

## NETWORK TYPE JUMPER

*1<sup>e</sup> 360, 8000, 8k 15*  
*2<sup>e</sup> 310, 8000, 8k*

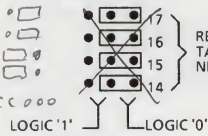
REFER TO  
TABLES ON  
NEXT PAGE

### HOST I/O BASE ADDRESS



ADDRESS 360H SHOWN

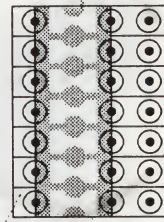
### MEMORY BASE ADDRESS



ADDRESS 000H SHOWN

REFER TO  
TABLES ON  
NEXT PAGE

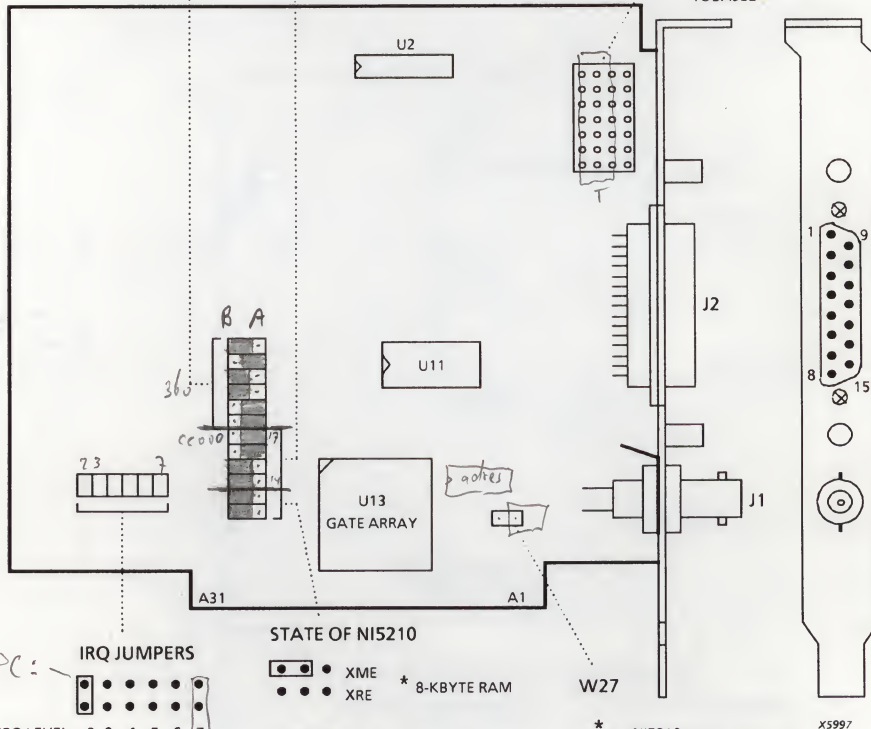
SETTING FOR  
STANDARD  
ETHERNET  
10BASE5



SETTING FOR  
THIN ETHERNET  
10BASE2

\* DEFAULT

*13 15*  
*318 330*



### PC: IRQ JUMPERS



IRQ LEVEL 2 3 4 5 6 7

*pg 122*  
*UNIX*  
*met voor DOS*

### STATE OF NI5210

XME XRE \* 8-KBYTE RAM

XME XRE 16-KBYTE RAM

XME XRE OPTIONAL BOOT PROM DEVICE

W27

\* NI5210 NOT IN SLOT 8 OF IBM PC XT

NI5210 IN SLOT 8 OF IBM PC XT

15.12-4

PC-OPTIONS CE

9009

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0 = A  
1 = B

## Host I/O Base Addresses

ADDRESS	W8	W7	W6	W5	W4	W3
200H	0	0	0	0	0	0
208H	0	0	0	0	0	1
210H	0	0	0	0	1	0
218H	0	0	0	0	1	1
220H	0	0	0	1	0	0
228H	0	0	0	1	0	1
230H	0	0	0	1	1	0
238H	0	0	0	1	1	1
240H	0	0	1	0	0	0
248H	0	0	1	0	0	1
250H	0	0	1	0	1	0
258H	0	0	1	0	1	1
260H	0	0	1	1	0	0
268H	0	0	1	1	0	1
270H	0	0	1	1	1	0
278H	0	0	1	1	1	1
280H	0	1	0	0	0	0
288H	0	1	0	0	0	1
290H	0	1	0	0	1	0
298H	0	1	0	0	1	1
2A0H	0	1	0	1	0	0
2A8H	0	1	0	1	0	1
2B0H	0	1	0	1	1	0
2B8H	0	1	0	1	1	1
2C0H	0	1	1	0	0	0
2C8H	0	1	1	0	0	1
2D0H	0	1	1	0	1	0
2D8H	0	1	1	0	1	1
2E0H	0	1	1	1	0	0
2E8H	0	1	1	1	0	1
2F0H	0	1	1	1	1	0
2F8H	0	1	1	1	1	1
300H	1	0	0	0	0	0
308H	1	0	0	0	0	1
310H	1	0	0	0	1	0
318H	1	0	0	0	1	1
320H	1	0	0	1	0	0
328H	1	0	0	1	0	1
330H	1	0	0	1	1	0
338H	1	0	0	1	1	1
340H	1	0	1	0	0	0
348H	1	0	1	0	0	1

## Host I/O Base Addresses (Continued)

ADDRESS	W8	W7	W6	W5	W4	W3
350H	1	0	1	0	1	0
358H	1	0	1	0	1	1
360H	1	0	1	1	0	0
368H	1	0	1	1	0	1
370H	1	0	1	1	1	0
378H	1	0	1	1	1	1
380H	1	1	0	0	0	0
388H	1	1	0	0	0	1
390H	1	1	0	0	1	0
398H	1	1	0	0	1	1
3A0H	1	1	0	1	0	0
3A8H	1	1	0	1	0	1
3B0H	1	1	0	1	1	0
3B8H	1	1	0	1	1	1
3C0H	1	1	1	0	0	0
3C8H	1	1	1	0	0	1
3D0H	1	1	1	0	1	0
3D8H	1	1	1	0	1	1
3E0H	1	1	1	1	0	0
3E8H	1	1	1	1	0	1
3F0H	1	1	1	1	1	0
3F8H	1	1	1	1	1	1

## Memory Base Addresses

ADDRESS	W17	W16	W15	W14
C0000H	0	0	0	0
C4000H	0	0	0	1
C8000H	0	0	1	0
CC000H	0	0	1	1
D0000H	0	1	0	0
D4000H	0	1	0	1
D8000H	0	1	1	0
DC000H	0	1	1	1
E0000H	1	0	0	0
E4000H	1	0	0	1
E8000H	1	0	1	0
EC000H	1	0	1	1

**Note:** Do not enable a memory base address of E0000H or higher in a P32XX or P33XX, this space is reserved for the host.

#### 15.12.4. Modification History NI5210 LAN Controller

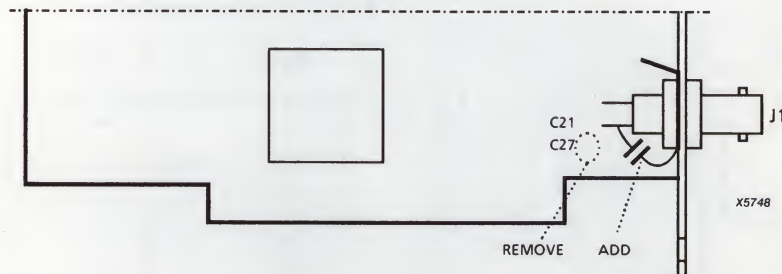
TYPE NUMBER	SOCKET NUMBER		REVISION LEVEL	
	AX BOARD	BX BOARD	AX BOARD	BX BOARD
Ethernet Address PROM 258-0006	U4			
8-Kbyte RAM Buffer HM6264LP-12	U1			
8-Kbyte RAM Buffer HM6264LP-12 (optional)	U3			
Ethernet Address PROM 63S081		U14		
PAL 258-0147-00		U9		AA
8-Kbyte RAM Buffer HM6264LP-12		U6		
8-Kbyte RAM Buffer HM6264LP-12 (optional)		U11		

Capacitor C21 (or C27) must be changed to meet the FTZ class A limits.

Remove the old C27 (on Rev. AX boards) or

Remove the old C21 (on Rev. BX boards).

Install a capacitor of the same magnitude (1.5 nF) directly between the nut used to connect the coax connector to the PC metal bracket and the coax shield pin of the connector. Refer to the next figure.



New boards with the label: BD5210-A8-VDE, do not need this modification, because they are already FTZ approved.

#### 15.12.5. Installation / Maintenance NI5210 LAN Controller

The NI5210 may be installed in any of the option board slots. Put the straps in the desired positions. Ensure that there is no conflict in board addresses or interrupts used with any other options installed. Power on the system. Run the NI5210 diagnostic program (NI5210DG.EXE) to confirm you have installed the board correctly.



## NI5210B INSTALLATION MANUAL UPDATE

When installing the NI5210B board, use this update in conjunction with the *NI5210 Installation Manual*.

### Major Components

Figure 1 shows the locations of the major components of the NI5210B board.

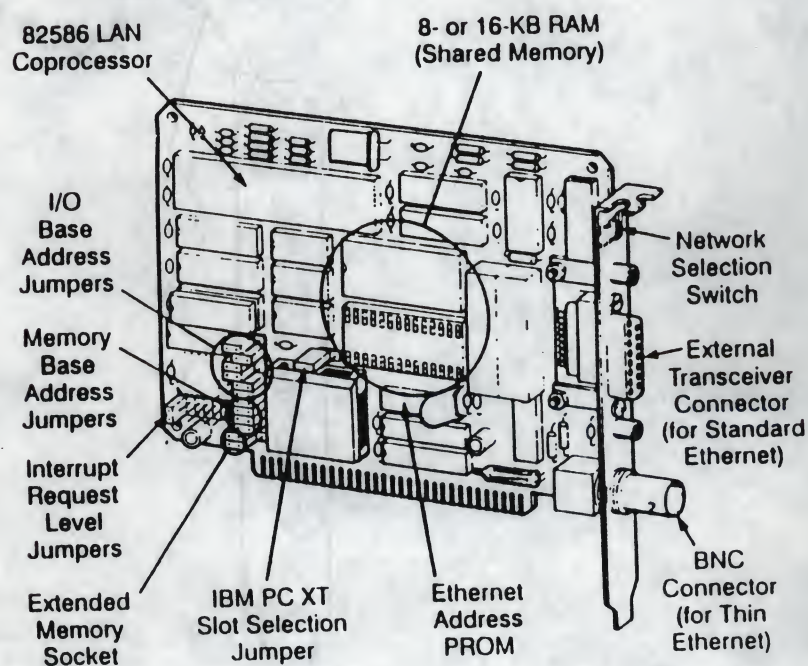


Figure 1. Major Components of the NI5210B



---

## Changing the Network Type

To change the network type setting, follow these steps:

1. Locate the switch on the board's mounting bracket, at the rear of the host. It is marked in the following way:

"ENET"—for Standard Ethernet—is UP

"THIN"—for Thin Ethernet—is DOWN

2. Slide the switch up to the position marked "ENET" (see Figure 2). You can now connect to a standard Ethernet network. The opposite position is for connecting to Thin Ethernet.



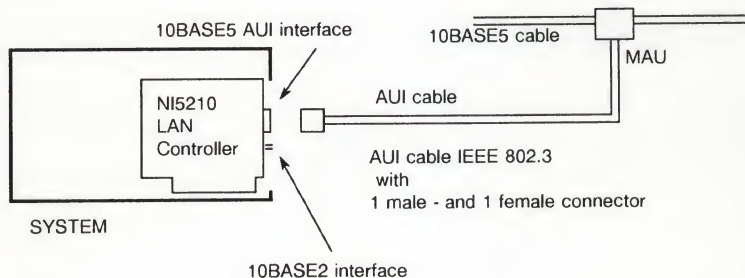
**Figure 2. Changing the Network Type Setting from Thin Ethernet to Standard Ethernet**

---

## 10BASE5 Networks

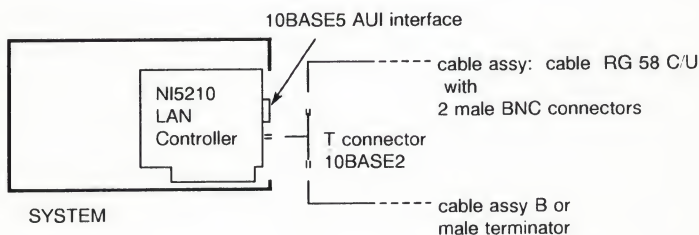
The NI5210 operates correctly only with Medium Attachment Units (MAUs) that are compatible with IEEE 802.3 and / or Ethernet V2.0 specifications. To minimize interfering with other systems, the NI5210's MAU should be at a mark on the cable which is a multiple of 2.5 metres (e.g. 2.5, 5.0 or 7.5 metres, etc.) from the transceiver adjacent to it. The NI5210 is connected with a standard AUI cable (max. 50 meters, with female and male D-connectors) to the MAU.

The NI5210 comes with a slide latch adapter plate, two screws and two clips. The AUI cable is latched with the adapter plate. The AUI cable is connected to a MAU. The MAU must be placed at a distance which is a multiple of 2.5 metres from an adjacent MAU, and on a mark on the 10BASE5 cable.



## 10BASE2 Networks

The NI5210 is connected with a BNC T-connector to the network. When the PC is the last or first one on the network, one end of the T-connector should be terminated with a 50-ohm BNC terminator. The shield of the cables in a network should be grounded at only one point. The T-connector should be isolated to prevent accidental connection to ground.



### 15.12.6. Diagnostic Functions NI5210 LAN Controller

Copy all the diagnostic files from the diskette labeled "DS-NI5210 - DI5Q" to any directory.

Programs:            NI5210DG.EXE (the executable diagnostic file)  
                     NI5210DG.HLP (the diagnostic help file)  
                     NI5210DG.FMT (the format file with diagnostic and board settings)

#### Diagnostic Program

Type NI5210DG <RETURN> to run the diagnostic program. A Diagnostic Main Menu will appear on the screen. Check if the parameters equal the setting on the NI5210.

- Select option D to change the parameters (if required)
- Select the required test(s)

Full details of the complete installation procedure, along with a complete list of error codes, are given in the NI5210 Installation Manual. Refer to this manual for further details (this manual is delivered with every NI5210 board).

## 15.13. PERSYST MULTIFUNCTION BOARD

### 15.13.1. Characteristics Persyst Multifunction Board

The Persyst Multifunction Board, as its name implies, is a multifunction board comprising the following features:

- Up to 704 Kbytes of RAM
- One serial port
- One parallel port
- Calendar/Clock with battery back-up

Depending on the number of serial or parallel ports in the system and the I/O addresses used, the serial port can be designated as COM1 or COM2, and the parallel port designated as LPT1, LPT2 or LPT3 (refer to sub-section 15.1.4.). The strapping of this board must not conflict with the settings of the serial and parallel ports present on other boards.

### 15.13.2. Connections Persyst Multifunction Board

Serial Port Connector J1

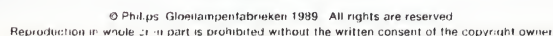
PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
1	DCD (I)	6	DSR (I)
2	RXD (I)	7	RTS(O)
3	TXD (O)	8	CTS (I)
4	DTR (O)	9	RI (I)
5	GROUND		



# Parallel Port Connector J2

PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
1	STROBE-N	14	AUTO FEED-N
2	DATA 1	15	ERROR-N
3	DATA 2	16	INIT-N
4	DATA 3	17	SELECT IN-N
5	DATA 4	18	GROUND
6	DATA 5	19	GROUND
7	DATA 6	20	GROUND
8	DATA 7	21	GROUND
9	DATA 8	22	GROUND
10	ACK-N	23	GROUND
11	BUSY	24	GROUND
12	PAPER END	25	GROUND
13	SELECT		

## 15.13-3



↑↑↑↑↑

SW1								FUNCTION
1	2	3	4	5	6	7	8	
Off	Off	Off	Off					Main board memory 64 Kbytes
On	Off	Off	Off					Main board memory 128 Kbytes
Off	On	Off	Off					Main board memory 192 Kbytes
On	On	Off	Off					Main board memory 256 Kbytes
Off	Off	On	Off					Main board memory 320 Kbytes
On	Off	On	Off					Main board memory 384 Kbytes
Off	On	On	Off					Main board memory 448 Kbytes
On	On	On	Off					Main board memory 512 Kbytes
Off	Off	Off	On					Main board memory 576 Kbytes
On	Off	Off	On					Main board memory 640 Kbytes
				Off	Off	Off		Multifunction board memory 64 Kbytes
				On	Off	Off		Multifunction board memory 128 Kbytes
				Off	On	Off		Multifunction board memory 192-256 Kbytes
				On	On	Off		Multifunction board memory 320-384 Kbytes
				Off	Off	On		Multifunction board memory 448 Kbytes
				On	Off	On		Multifunction board memory 512 Kbytes
				Off	On	On		Multifunction board memory 576 Kbytes
				On	On	On		Multifunction board memory 640-704 Kbytes
							Off	Split memory option disabled
							On	Split memory option enabled *

**Note:** Split memory option allows 128 Kbytes of memory in the area from D0000H-F0000H to be used on the Multifunction board, refer to the Installation Manual for further details of this option (this manual is delivered with every Multifunction board)

↓↓↓

SW2				FUNCTION
1	2	3	4	
On				Parallel port address 378H *
Off				Parallel port address 278H *
	On			Calendar/clock address 350H *
	Off			Calendar/clock address 250H
		On		Serial port address range 3F8-3FFH *
		Off		Serial port address range 2F8-2FFH *
			On	Calendar/clock disabled
			Off	Calendar/clock enabled *

**Note :** \* Indicates default setting

### 15.13.5. Installation / Maintenance Persyst Multifunction Board

The Multifunction Board may be installed in any of the option board slots on the main PCB. When installing this board, check other option boards (or main board) with serial or parallel ports. Ensure that there is no duplication of port addresses present within the total system.

The name of the serial or parallel port, as used by MS-DOS, is related to the I/O address selected. Refer to sub-section 15.1.4. for names used by MS-DOS.

SI P3100-061







system series: P3100

model: P3102-4

main assy:  
Main controller

nr. P3100-061

units affected:

est.inst.time: 30 minutes.

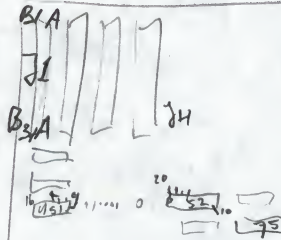
date: 880127 revised:

title: Memory upgrade on the P3102-4 with  
PERSYST multi function board (P3109-027)

note:

this change is: Retrofit on failure

1. CONDITION : Revision G of the multifunction board gives problems with memory upgrading on the P3102-4. The MEMW signal goes unbuffered to the I/O exp. slots.
2. CORRECTION : The MEMW signal to expansion slots is buffered through a 74LS244.
3. REMOVE : On component side - cut the track to pin 11 on U51 (74ALS153).
4. ADD : Connect the following points:  
U52 pin 19 - (ENA) - U52 pin 10 (GND) (74LS244)  
U75 pin 5 (MEMW) - U52 pin 17 (input)  
U52 pin 3 (output) - Exp. slot connector J1 B11
5. ADJUSTMENTS : None
6. PARTS : None.
7. STATUS CHANGE : Field change. The latest levels were 5107265104 19 or 5107265104 22, new level info will be given as soon as it is available.
8. TEST FACILITIES  
AFFECTED : None
9. DOCUMENTS  
AFFECTED : None
10. REMARKS : None.



Responsibility: Mr. C. v.d. Hout

The following is a list of the names of the persons who have been  
 named in the above mentioned document, in the order in which they  
 are named in the same:

1. John A. Smith  
 2. John B. Smith  
 3. John C. Smith  
 4. John D. Smith  
 5. John E. Smith  
 6. John F. Smith  
 7. John G. Smith  
 8. John H. Smith  
 9. John I. Smith  
 10. John J. Smith  
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 217. John I. Smith  
 218. John J. Smith  
 219.

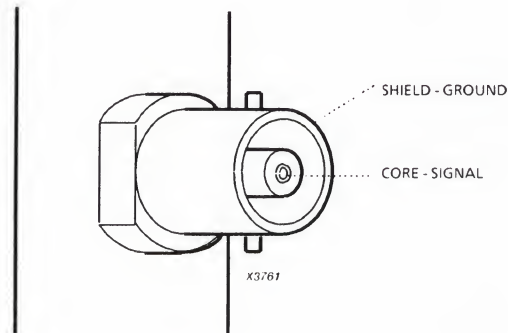
## 15.14. PCOX/COAX

### 15.14.1. Characteristics PCOX/COAX

The PCOX/COAX board and associated software provides all that is required to perform emulation of the IBM 3278/3279 terminals, for direct mainframe access. The necessary ASCII/EBCDIC conversion is performed by the PCOX/COAX board. The software included emulates IBM 3278 models 2, 3, 4, or 5 and IBM 3279 models 2A, 3A, 4, or 5. Model 5 is available only for the none windowed control program. With the correct software, it is possible for a PC printer to emulate an IBM 3287. When using the windowed control program, a host session, a PC session, and up to two notepads are available. The board can operate fully IRMA compatible concurrent with the CXI 3270 application, however when the IRMA application is configured for using extended attributes, no 3278/3279 emulation is possible. The micro codes to support the IBM terminal emulation and the IRMA mode are down loaded to the PCOX/COAX board when the emulator is started. Different national versions of keyboards can be configured.

### 15.14.2. Connections PCOX/COAX

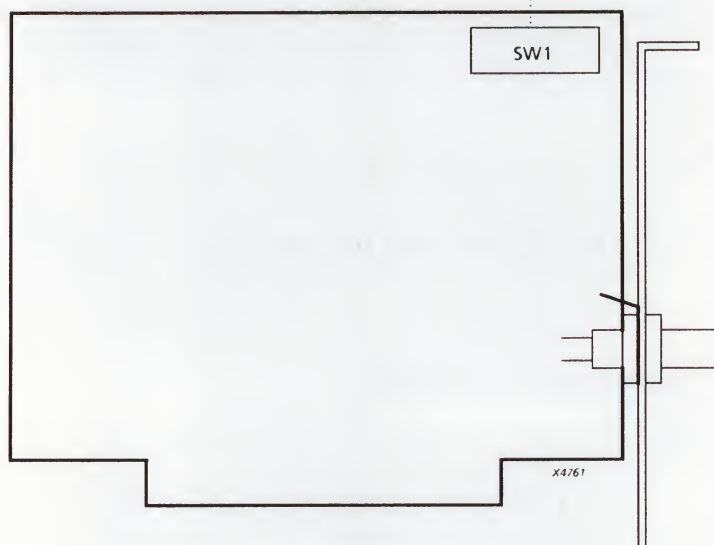
Line Connector





### 15.14.3. Strap Settings / Adjustments PCOX/COAX

SEE TABLE BELOW



The switch settings for SW1-1 through SW1-3 are given below. SW1-4 is not used and should be left in the off position.

SW1 SETTING			FUNCTION
1	2	3	
Off	Off		I/O address range 220-22FH *
Off	On		I/O address range 620-62FH
On	Off		I/O address range A20-A2FH
On	On		I/O address range E20-E2FH
		Off	Normal setting *
		On	Only when board installed in slot 8 of IBM PC XT

**Note:** \* Indicates default setting

#### **15.14.5. Installation / Maintenance PCOX/COAX**

This board plugs into either a PC or AT I/O slot. The host connection consists of connecting the RG-62U coaxial cable from the host (not supplied with this board), to the line connector. It is important to check that the user's data processing department (the department responsible for the host system) is aware of, and has performed, the software installation as set forth in the CXI documentation. Software installation is required on both the PC and the host system. When running the menu driven installation program a software selection of I/O addresses and DMA channels can be made, however, the on-board switch selections must be the same as the software selected ones to ensure proper operation. For more details of the installation program see the PCOX/COAX Installation Guide (delivered with every board).

#### **15.14.6. Diagnostic Functions PCOX/COAX**

The PCOX/COAX diagnostic program tests the custom processor, the on board memory and the other functions of the board. The only part it cannot test is the physical line interface (as the communication interface is half-duplex, it is not possible to perform a loopback test).

To initiate the test, insert the diagnostics disk in drive A and select drive A as the current drive. At the DOS prompt, type cxidiag <CR> (it is not necessary for the PCOX/COAX emulation software to be resident in memory to perform these tests). Now a menu appears for the selection of different tests, for more details refer to the PCOX/COAX Installation Guide.



## 15.15. SPECIALIX SI HOST CARD I/O CONTROLLER

### 15.15.1. Characteristics SI Host Card I/O Controller

The SI Host Card is an intelligent I/O controller based on the Zilog Z280 microprocessor. Also 32 KB of static RAM is located on the card (another 32 KB is optional). The SI Host Card can only be used in AT based systems. An adapter box with 4 or 8 serial ports (RS232) can be connected to the controller. The difference between adapter boxes with 4 and 8 serial ports is only the amount of serial ports. The ports on the adapter box are controlled via a 37-pin connector (PL1) on the SI Host Card. Each adapter box has 4 or 8 serial ports and two 37 pin connectors. One is used to connect the box to the controller or to a former adapter box and one can be used to connect a following adapter box. To each controller card 4 adapter boxes in a row can be connected providing a maximum of 32 serial ports.

There are two levels of the card :

- Revision 1 (SI Host Card 1)
- Revision 2 (SI Host Card 2)

There are 4 differences between revision 1 and 2 :

- There is no interrupt jumper block on the SI Host Card 2.
- The SI Host Card 2 occupies 32 K of address space.
- The address selection is done by two rotary switches and one jumper on the SI Host Card 2 instead of only one jumper on the SI Host Card 1.
- The SI Host Card 2 has a new set of drivers. These drivers are compatible with SI Host Card 1.



### 15.15.2. Connections SI Host Card I/O Controller

Output Connector PL1 :

PIN No.	SIGNAL NAME	PIN No.	SIGNAL NAME
1	D0	20	ZRD-N
2	D1	21	ZWR-N
3	D2	22	RESET
4	D3	23	EN2-N
5	D4	24	EN3-N
6	D5	25	EN4-N
7	D6	26	EN1-N
8	D7	27	+ 12 Vdc
9	ZA0	28	+ 12 Vdc
10	ZA1	29	-12 Vdc
11	ZA2	30	-12 Vdc
12	ZA3	31	+ 5 Vdc
13	ZA4	32	+ 5 Vdc
14	ZA5	33	+ 5 Vdc
15	ZA6	34	GROUND
16	IR1-N	35	GROUND
17	IR2-N	36	GROUND
18	IR3-N	37	GROUND
19	IR0-N		

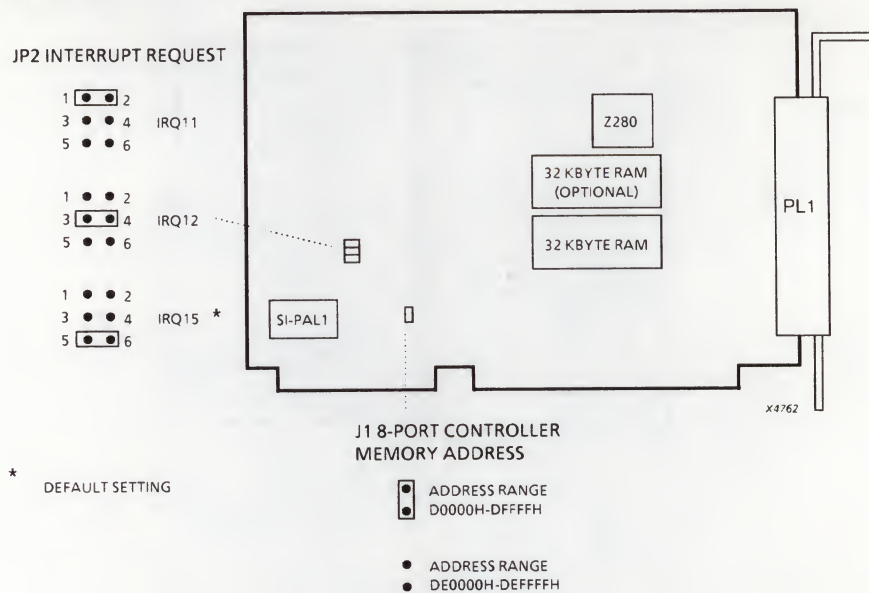
Adapter Box RS232 Connector (DCE) :

*female*

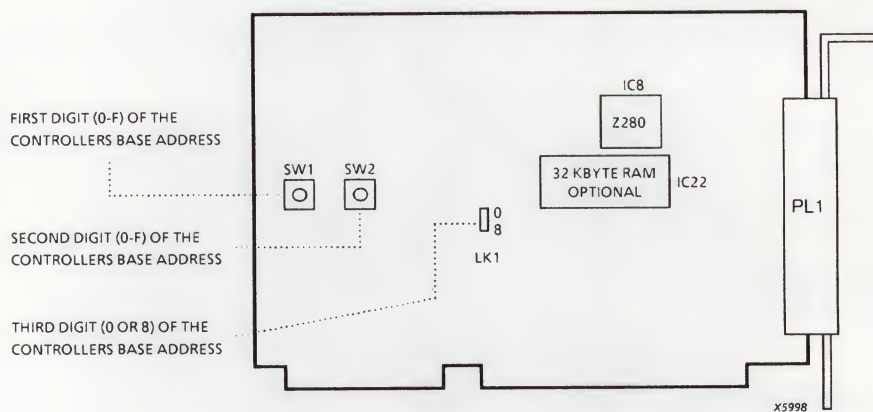
PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	SHIELD	14	N.C.
2	TXD (I)	15	N.C.
3	RXD (O)	16	N.C.
4	RTS (I)	17	N.C.
5	CTS (O)	18	N.C.
6	DSR (O)	19	N.C.
7	GROUND	20	DTR (I)
8	DCD <del>DCI</del> /	21	N.C.
9	N.C.	22	N.C.
10	N.C.	23	N.C.
11	N.C.	24	N.C.
12	N.C.	25	N.C.
13	N.C.		

### 15.15.3. Strap Settings / Adjustments SI Host Card I/O Controller

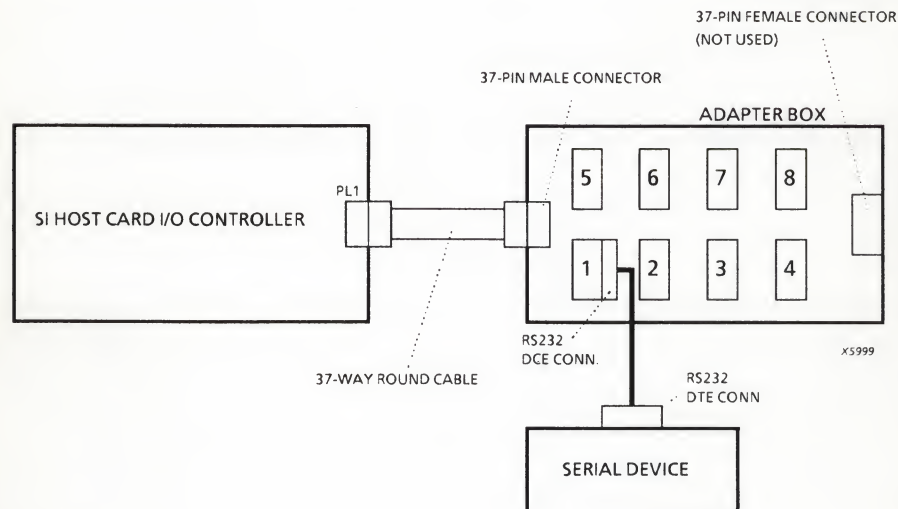
#### SI Host Card 1.



#### SI Host Card 2.



### 15.15.5. Installation / Maintenance SI Host Card I/O Controller



#### SI Host Card 1

Ensure that the controller is strapped for the correct interrupt level (JP2) and address range (J1). If two controllers are installed in one system, ensure that they use different interrupts and addresses. Install the controller in an AT-type option slot in the system. Locate the adapter box in a suitable location close to the system. Connect the 37-way adapter box cable to PL1 on the controller and the 37-pin male connector on the adapter box. Connect serial devices as required to the 25-pin RS232 DCE connectors on the adapter box. It is not necessary to connect serial devices to the adapter box in sequence. For example, if only one device is connected it may be connected to any of the 25-pin connectors (1 to 4/8) on the adapter box).

#### SI Host Card 2

##### Hardware

Ensure that the controller is strapped for the correct address range (SW1, SW2, LK1). If two controllers are installed in one system, ensure that they use different addresses. Install the controller in an AT-type option slot in the system. Locate the adapter box in a suitable location close to the system. Connect the 37-way adapter box cable to PL1 on the controller and the 37-pin male connector on the adapter box. Connect serial devices as required to the 25-pin RS232 DCE connectors on the adapter box. It is not necessary to connect serial devices to the adapter box in sequence. For example, if only one device is connected it may be connected to any of the 25-pin connectors (1 to 4/8) on the adapter box).



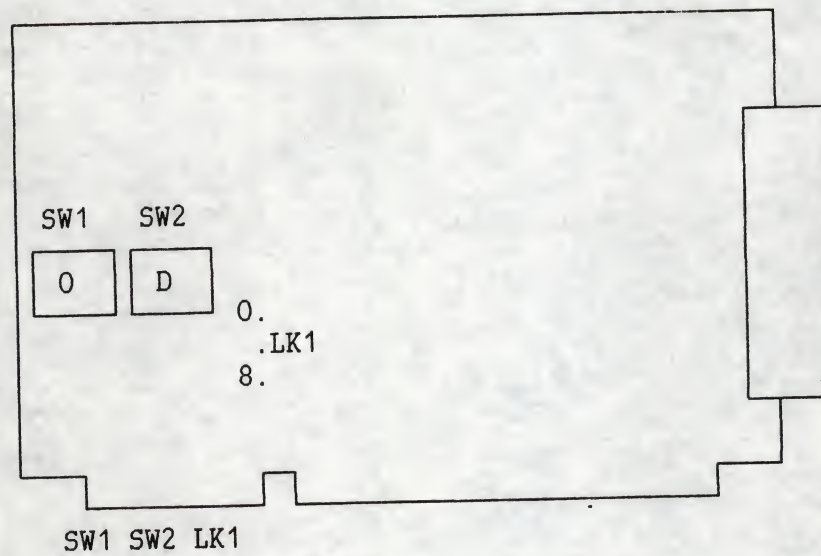
#### Software

Copy the necessary files to the harddisk. Add the device driver with the right parameters to the config.sys file.

E.g.        DEVICE = DRIVERNAME.SYS /P1 /P2 /P3 .....

One of the parameters selects the interrupt level. If two controllers are installed in one system, ensure that they use different interrupts. Refer to the installation manual.

SPECIALIX SI8 8-Port Controller Rev.2



Adres: 0D0000-0D8000 (32k lang)  
INTERRUPT: 11,12 of 15;no straps: via driver ingesteld.

1911-12	
1	2
3	4
5	6
7	8
9	10
11	12
13	14
15	16
17	18
19	20
21	22
23	24
25	26
27	28
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71	72
73	74
75	76
77	78
79	80
81	82
83	84
85	86
87	88
89	90
91	92
93	94
95	96
97	98
99	100

THE UNIVERSITY OF CHICAGO

## **15.16. NP600 LAN CONTROLLER**

### **15.16.1. Characteristics NP600 LAN Controller**

The NP600 LAN Controller is an intelligent Ethernet Controller, that allows communication with other devices over an Ethernet Local Area Network. The NP600 is fully compatible with standard Ethernet (IEEE 802.3 10BASE5) networks and Thin Ethernet (Cheapernet) (IEEE 802.3 10BASE2) networks. The NP600 is based on the 80186 microprocessor, and equipped with an 82586 LAN Coprocessor.

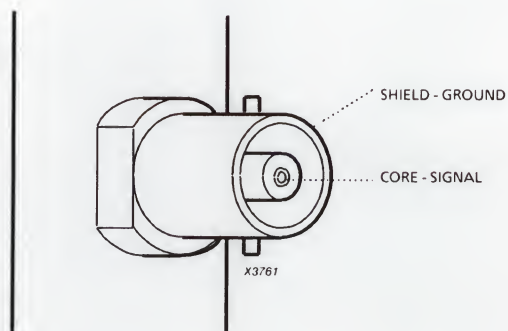


## 15.16.2. Connections NP600 LAN Controller

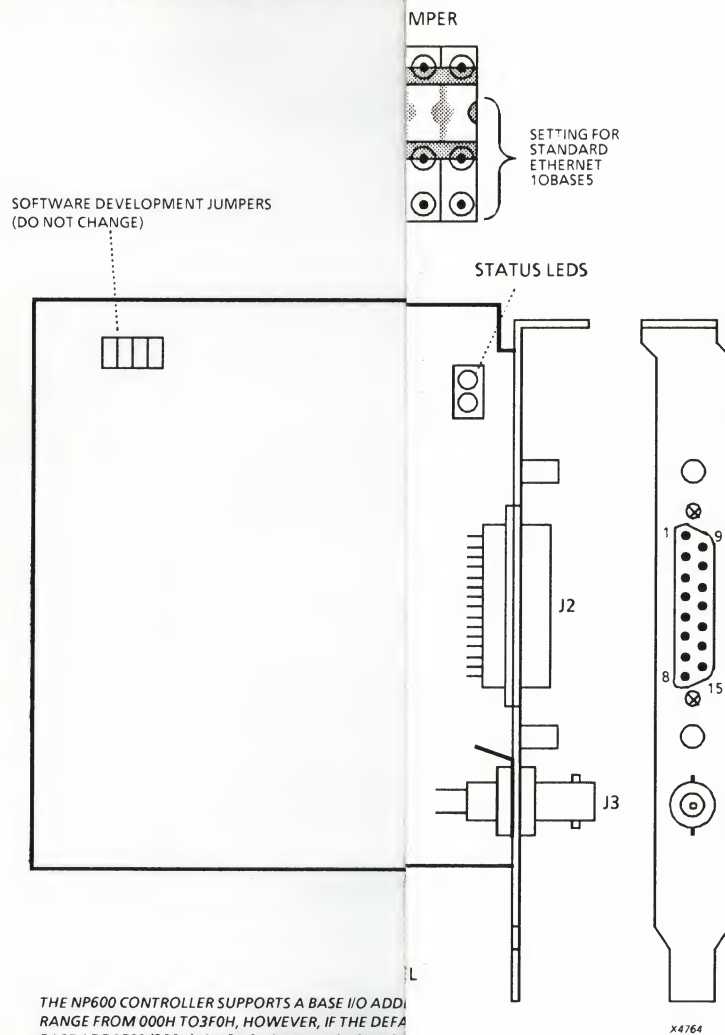
10BASE5 IEEE 802.3 Connector J2 (15-Pin Female)

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	Shield	9	Collision Presence -
2	Collision Presence +	10	Transmit -
3	Transmit +	11	Shield (Transmit)
4	Shield (Receive)	12	Receive -
5	Receive +	13	Power +12V
6	Power return	14	Shield (Voltage)
7	Reserved	15	Reserved
8	Reserved		

10BASE2 IEEE 802.3 Connector J3



### 15.16.3. Strap Settings / Adjustment



THE NP600 CONTROLLER SUPPORTS A BASE I/O ADDRESS RANGE FROM 000H TO 3F0H, HOWEVER, IF THE DEFAULT BASE ADDRESS (300H) IS NOT SUITABLE, USE ONE OF THE ADDRESSES GIVEN IN THE TABLE ON THE NEXT TWO PAGES (ALL ADDRESSES ARE ON 8-BIT BOUNDARIES).

\* INDICATES DEFAULT SETTING

ADDRESS	A3	A4	A5	A6	A7	A8	A9
200H	0	0	0	0	0	0	1
208H	1	0	0	0	0	0	1
210H	0	1	0	0	0	0	1
218H	1	1	0	0	0	0	1
220H	0	0	1	0	0	0	1
228H	1	0	1	0	0	0	1
230H	0	1	1	0	0	0	1
238H	1	1	1	0	0	0	1
240H	0	0	0	1	0	0	1
248H	1	0	0	1	0	0	1
250H	0	1	0	1	0	0	1
258H	1	1	0	1	0	0	1
260H	0	0	1	1	0	0	1
268H	1	0	1	1	0	0	1
270H	0	1	1	1	0	0	1
278H	1	1	1	1	0	0	1
280H	0	0	0	0	1	0	1
288H	1	0	0	0	1	0	1
290H	0	1	0	0	1	0	1
298H	1	1	0	0	1	0	1
2A0H	0	0	1	0	1	0	1
2A8H	1	0	1	0	1	0	1
2B0H	0	1	1	0	1	0	1
2B8H	1	1	1	0	1	0	1
2C0H	0	0	0	1	1	0	1
2C8H	1	0	0	1	1	0	1
2D0H	0	1	0	1	1	0	1
2D8H	1	1	0	1	1	0	1
2E0H	0	0	1	1	1	0	1
2E8H	1	0	1	1	1	0	1
2F0H	0	1	1	1	1	0	1
2F8H	1	1	1	1	1	0	1
300H	0	0	0	0	0	1	1
308H	1	0	0	0	0	1	1
310H	0	1	0	0	0	1	1
318H	1	1	0	0	0	1	1
320H	0	0	1	0	0	1	1
328H	1	0	1	0	0	1	1
330H	0	1	1	0	0	1	1
338H	1	1	1	0	0	1	1
340H	0	0	0	1	0	1	1
348H	1	0	0	1	0	1	1
350H	0	1	0	1	0	1	1
358H	1	1	0	1	0	1	1

Host I/O Base Addresses (continued on next page)

ADDRESS	A3	A4	A5	A6	A7	A8	A9
360H	0	0	1	1	0	1	1
368H	1	0	1	1	0	1	1
370H	0	1	1	1	0	1	1
378H	1	1	1	1	0	1	1
380H	0	0	0	0	1	1	1
388H	1	0	0	0	1	1	1
390H	0	1	0	0	1	1	1
398H	1	1	0	0	1	1	1
3A0H	0	0	1	0	1	1	1
3A8H	1	0	1	0	1	1	1
3B0H	0	1	1	0	1	1	1
3B8H	1	1	1	0	1	1	1
3C0H	0	0	0	1	1	1	1
3C8H	1	0	0	1	1	1	1
3D0H	0	1	0	1	1	1	1
3D8H	1	1	0	1	1	1	1
3E0H	0	0	1	1	1	1	1
3E8H	1	0	1	1	1	1	1
3F0H	0	1	1	1	1	1	1

Host I/O Base Addresses (continued)



### 15.16.5. Installation / Maintenance NP600 LAN Controller

The NP600 may be installed only in an AT-type option board slot. Put the straps in the desired positions. Ensure that there is no conflict in board addresses, interrupts or DMA channels used with any other options installed. Power on the system and check the LEDs (refer to section 15.16.6.). Run the NP600 diagnostic program (NP600DG.EXE) to confirm you have installed the board correctly. Set up AUTOEXEC.BAT to install the "Philips ISO Protocols & NetBIOS", each time you boot your PC:

1. Copy all the files from the diskette labeled "Philips ISO Protocols & NetBIOS" to any directory.

Programs: NP600DRV.EXE (installs NP600LDR, and loads NetBIOS and transport protocol resident in memory)  
NP600LDR.EXE (installs NP600BRD)  
NP600BRD.EXE (BIN file downloaded by NP600LDR)  
NP600DG.EXE (diagnostic program)

Help file : READ.ME

2. Use an editor, e.g. EDLIN to update AUTOEXEC.BAT file:

```
NP600DRV -bxxx -iy -dz [-v]
```

where:      xxx    =    I/O base address.  
             y      =    Interrupt request level.  
             z      =    DMA channel.  
             v      =    Verbose option (information is displayed during power up).

For example NP600DRV -b300 -i3 -d1 would install all of the required files on a NP600 that was strapped for I/O base address 300H, Interrupt level 3, DMA channel 1. This data and the NP600's unique Ethernet number is reported each time you boot the PC.

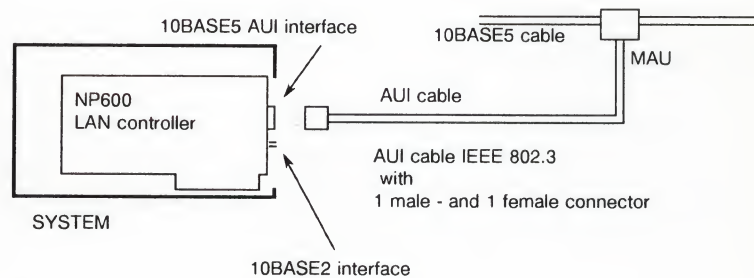
#### P3202

Some timing problems with NP600/P3202 can be solved by inserting a PAL (12NC : 5107 299 67651) at position U70 on the main PCB. Strap U11 must be inserted to enable the PAL on the main PCB.

## 10BASE5 Networks

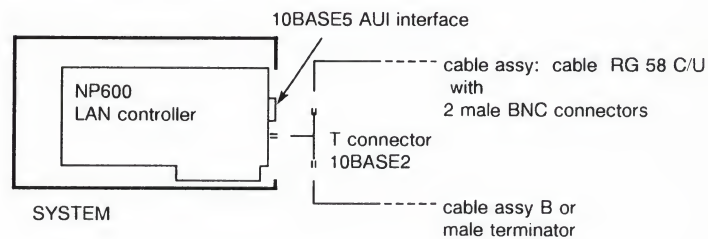
The NP600 operates correctly only with Medium Attachment Units (MAU's) that are compatible with IEEE 802.3 and / or Ethernet V2.0 specifications. To minimize interfering with other systems, the NP600's MAU should be at a mark on the cable which is a multiple of 2.5 metres (e.g. 2.5, 5.0 or 7.5 metres etc.) from the transceiver adjacent to it. The NP600 is connected with a standard AUI cable (max. 50 metres, with female and male D-connectors) to the MAU.

The NP600 comes with a slide latch adapter plate, two screws and two clips. The AUI cable is latched with the adapter plate. The AUI cable is connected to a MAU. The MAU must be placed at a distance which is a multiple of 2.5 metres from an adjacent MAU and on a mark on the 10BASE5 cable.



## 10BASE2 Networks

The NP600 is connected with a BNC T-connector to the network. When the PC is the last or first one on the network, one end of the T-connector should be terminated with a 50-ohm BNC terminator. The shield of the cables in a network should be grounded at only one point. The T-connector should be isolated to prevent accidental connection to ground.



### 15.16.6. Diagnostic Functions NP600 LAN Controller

#### LED Output

Refer to section 15.16.3 for LED locations. Each time the NP600 is turned on, the two status LEDs report the board's basic hardware status.

RED LED	GREEN LED	FUNCTION
Off	On	Normal state, LAN connection is operational
On	On	Kernel test failed
On	Off	Kernel test passed, but general elements test failed
Off	Off	Kernel and general elements tests passed but LAN connection test failed

#### Diagnostic Program

Type NP600DG <RETURN> to run the diagnostic program (press CTRL-C at any time to exit the diagnostic program). A Diagnostic Configuration Menu will appear on the screen. Check if the Current Configuration equals the settings on the NP600. Press the carriage return key (3 times) to accept the default settings, or enter the required value then press carriage return to change a setting.

Once you have completed the new selections, the new settings are displayed on a new menu. If you wish to change the settings, select NO. The original menu will reappear and you can change the settings as described previously. If you wish to accept the new settings, select YES. After selecting YES, the message "INITIALIZING HARDWARE" is displayed, followed by the message "RUNNING ALL TESTS". If these messages are not displayed, it is probable that the DMA channel is incorrectly set. To correct this problem, exit the diagnostic program, power-off the system and select an unused DMA channel, then complete the installation procedure from the beginning. If the "RUNNING ALL TESTS" message is displayed, then the diagnostic program is testing the following:

Kernel Tests:	EPROM RAM Host interface
General Elements Tests:	80186 CPU timer Ethernet Address PROM DMA Controller 82586 LAN Coprocessor
LAN Connection Test:	Network functionality

If all tests are completed normally, the message "TESTING COMPLETE HIT <RETURN> TO CONTINUE..." is displayed. Press <RETURN>, the diagnostic test menu is then displayed as shown below.

[01]	DISPLAY TEST RESULTS	[02]	DISPLAY CSR3-CSR0
[03]	RESET HARDWARE	[04]	RUN MICRO-DIAGNOSTIC
[05]	RUN BASIC TESTS	[06]	RUN ENHANCED TESTS
[07]	RUN ALL TESTS	[08]	....HELP....

ENTER LINE [ <CONTROL C> TO EXIT]...

Use CTRL-C to return to the DOS prompt, this completes the installation procedure. If an error is encountered during the running of the micro diagnostic program, the number of tests, number of failures, and the test number are displayed. Full details of the meanings of these (along with the use of the menu shown above) are described in the NP600 Installation Manual. This manual is delivered with every NP600 controller, refer to this manual for further details.





## 15.17. NETWORK PROCESSOR (IVA)

### 15.17.1. Characteristics Network Processor (IVA)

The network processor (IVA) is used to support LWSI / RWSI or Wide Area Networks.

The IVA has two physical DC interfaces:

- channel A selectable for LWSI (primary or secondary), V.24, V.35 or X.21
- channel B selectable for V.24, V.35 or X.21.

Both interfaces can operate independently, full duplex.

The IVA operates as DMA master on the AT bus. Only during the beginning of initialisation the IVA operates in slave mode.

The basic hardware of the IVA comprises the following:

- the internal hardware structure is built around a 68010 and a 68000 microprocessor
- the local memory size is 1 Mbyte
- firmware in EPROM, size 128 Kbytes (supervisor and self-test)
- NRZ and NRZI is possible
- Diagnostic Test Interface (DTI) for:
  - firmware diagnostic functions (connector tests)
  - debugging load module
- hardware self tests after power-on.

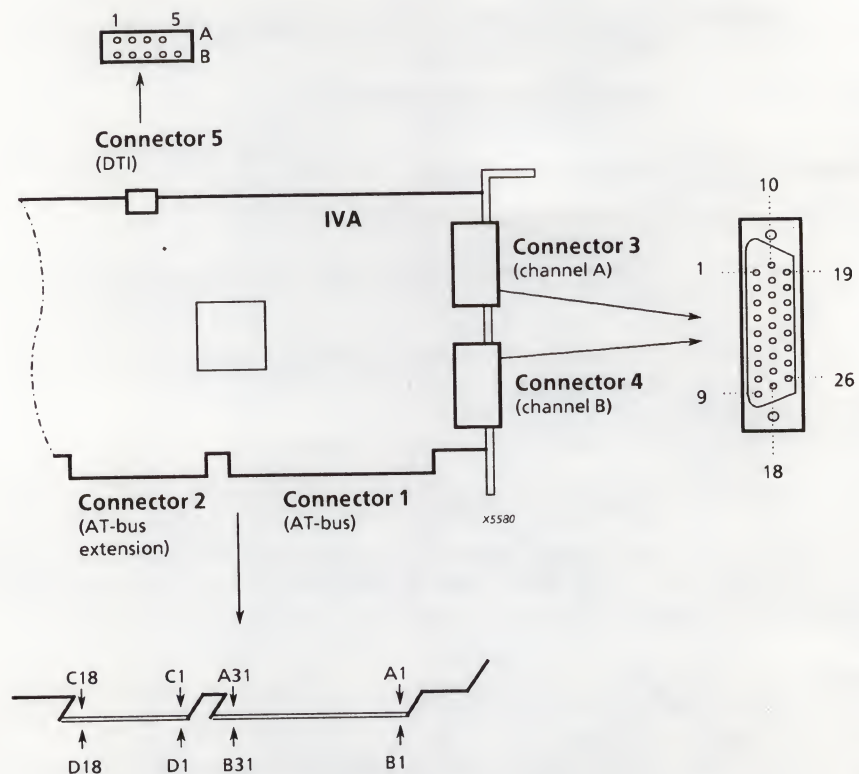
If the IVA-2 board is used on the EISA-bus, it can also support shared interrupt. In this case more than one IVA-2 boards can be strapped on the same interrupt level. (reduces conflict situations on interrupt levels)

**NOTE:** *There are two IVA boards released:*

- IVA-1 (old version)
- IVA-2 (new version)

*Both boards mainly have the same function. If the information in this section is valid for both boards, than this is described with the name "IVA". Differences are described with the names IVA-1 and IVA-2.*

## 15.17.2. Connections Network Processor (IVA)



# Connector 4 (V.35 Channel B)

PIN	SIGNAL NAME	I/O	PIN	SIGNAL NAME	I/O	PIN	SIGNAL NAME	I/O
1	RDa	I	10	C109	I	19		
2			11	C106	I	20		
3			12	C107	I	21		
4	C105	O	13			22*	RCb	I
5	TCa	I	14*	TDb	O	23		
6	TCb	I	15			24		
7	C102		16*	TDa	O	25		
8	RCa	I	17			26	RDb	I
9			18					

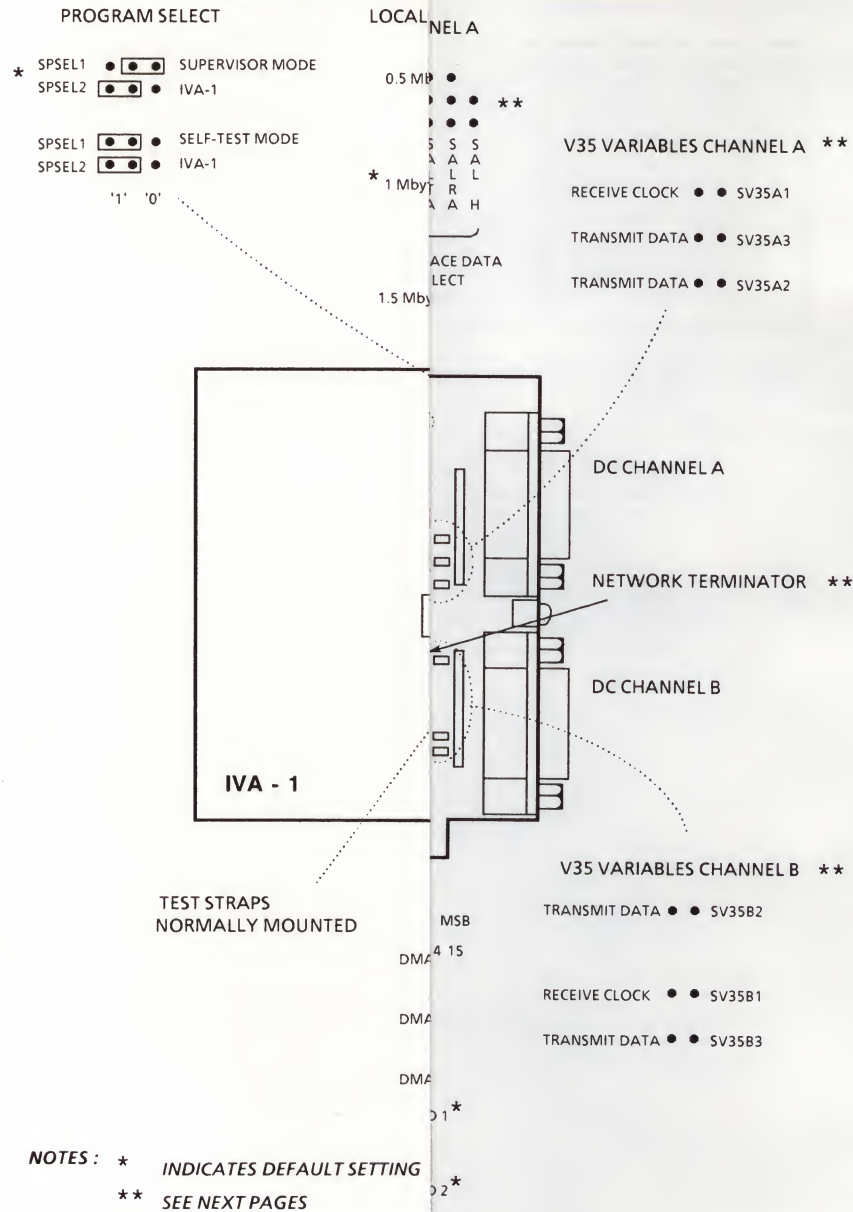
**NOTE:** The signals on pins 14, 16 and 22 (\*) are selected by straps

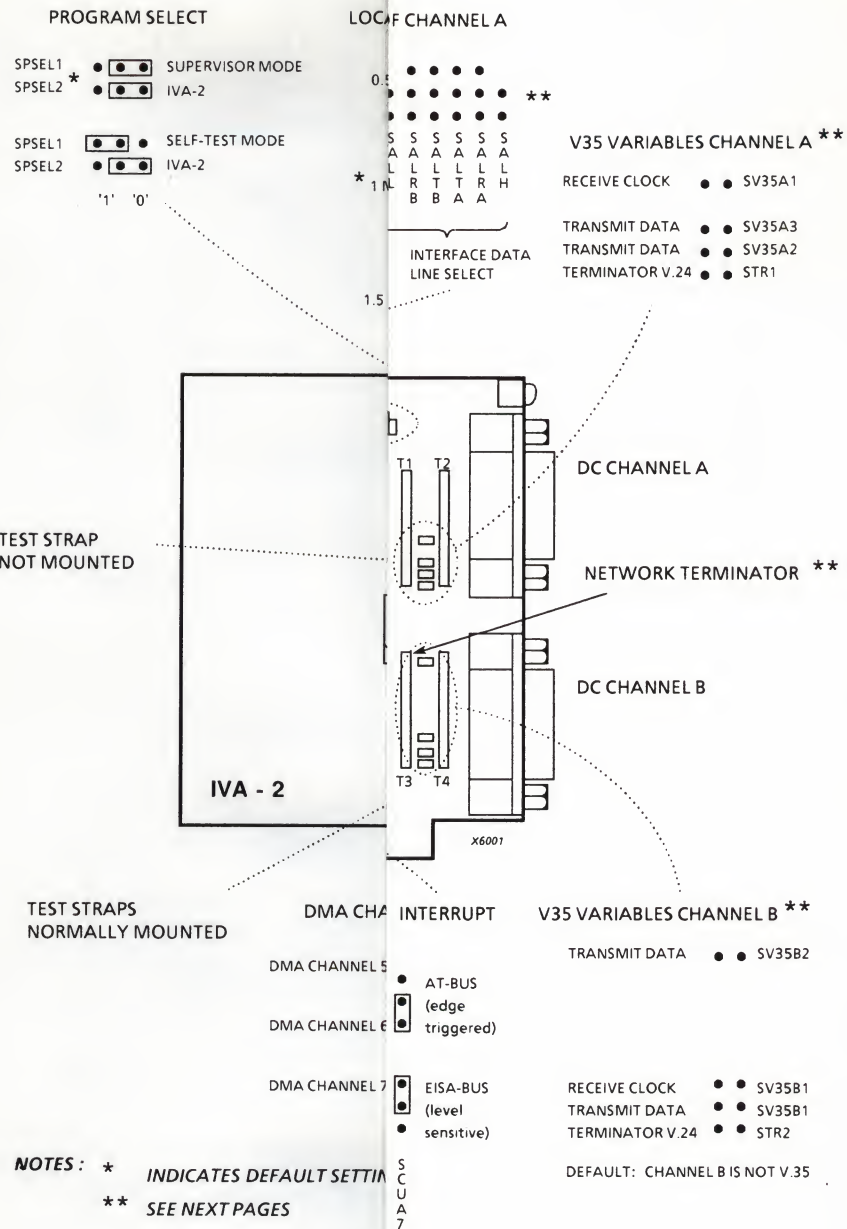
## Connector 5 (DTI)

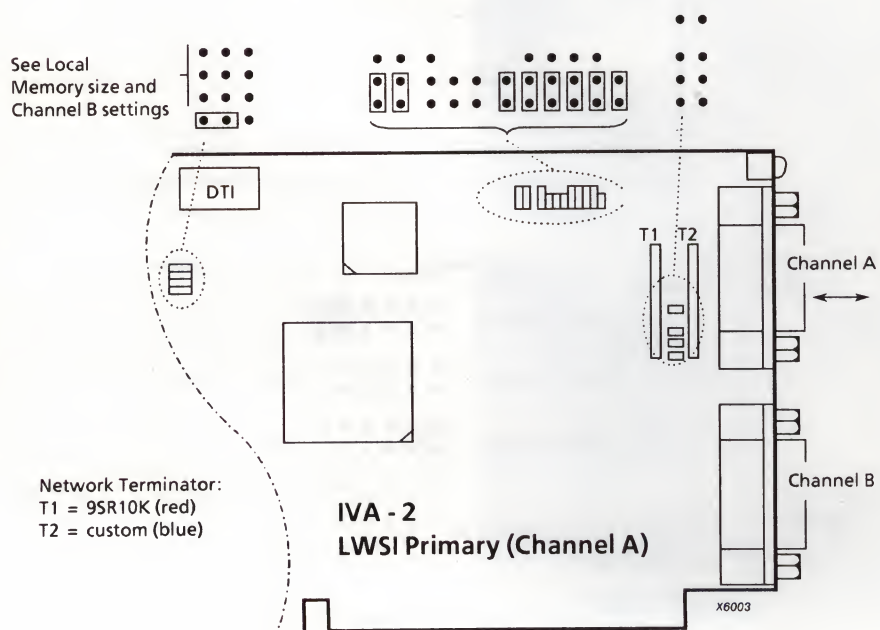
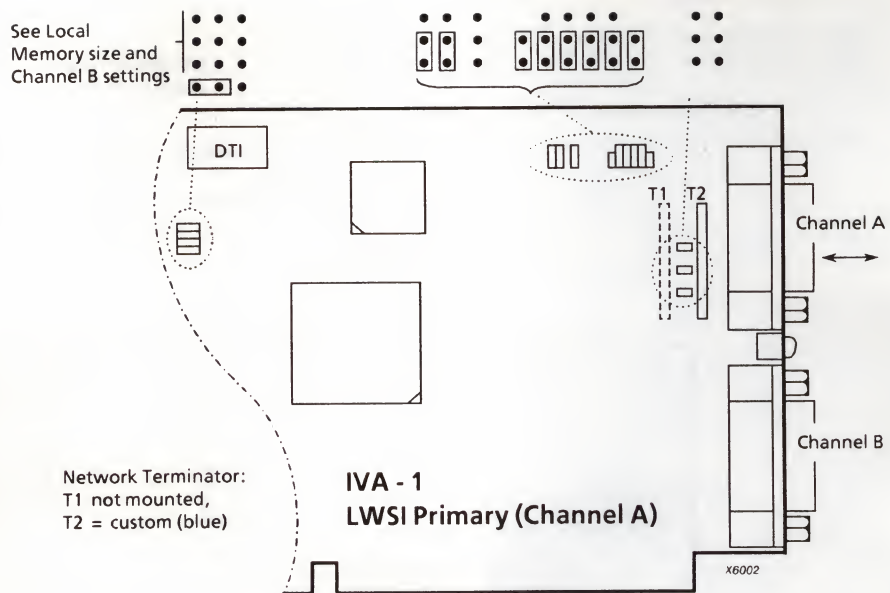
PIN	SIGNAL NAME	I/O	PIN	SIGNAL NAME	I/O
A01	CONNECTN	I	B01	SDUTN	O
A02	L		B02	SDTUN	I
A03	L		B03	RESETN	I
A04	L		B04		
A05	DUMMY		B05	L	

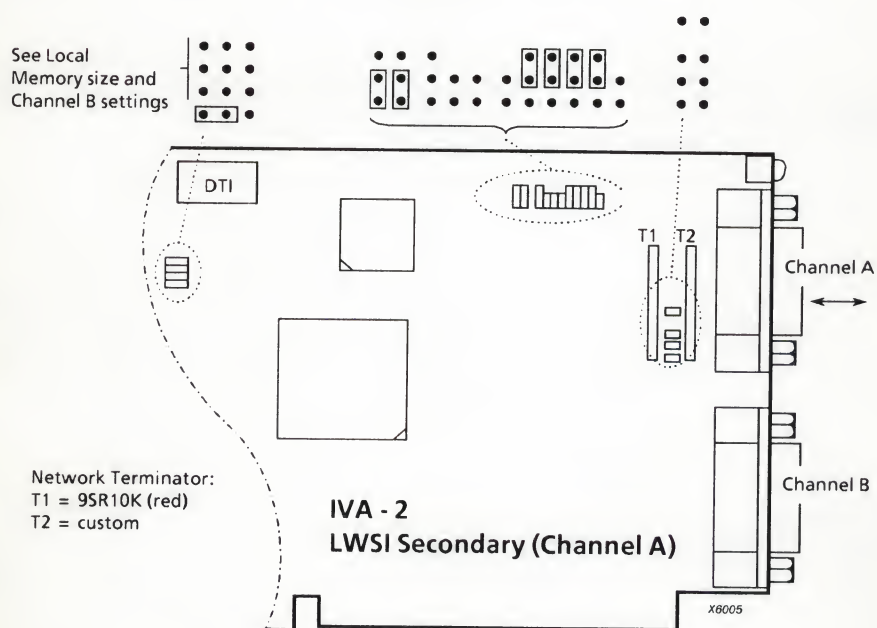
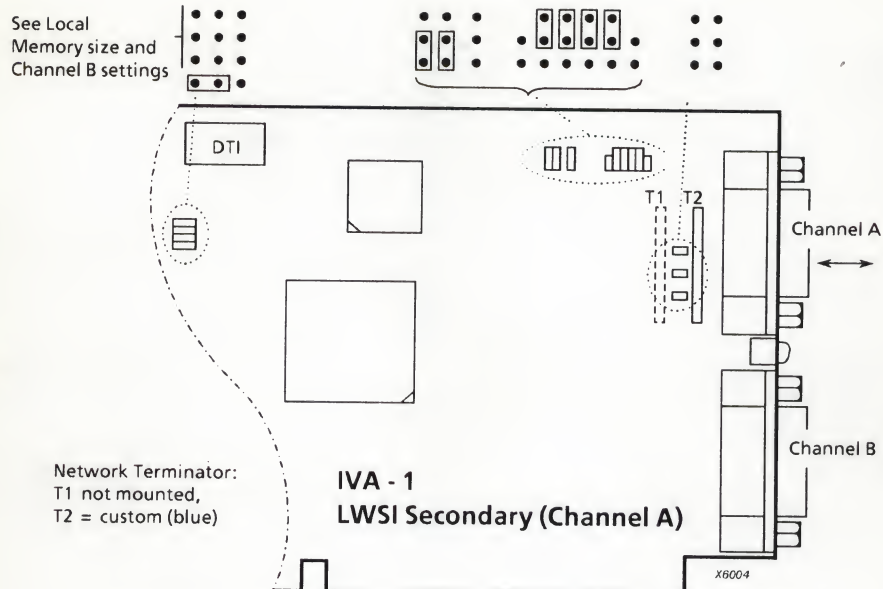


### 15.17.3. Strap Settings / Adjustment

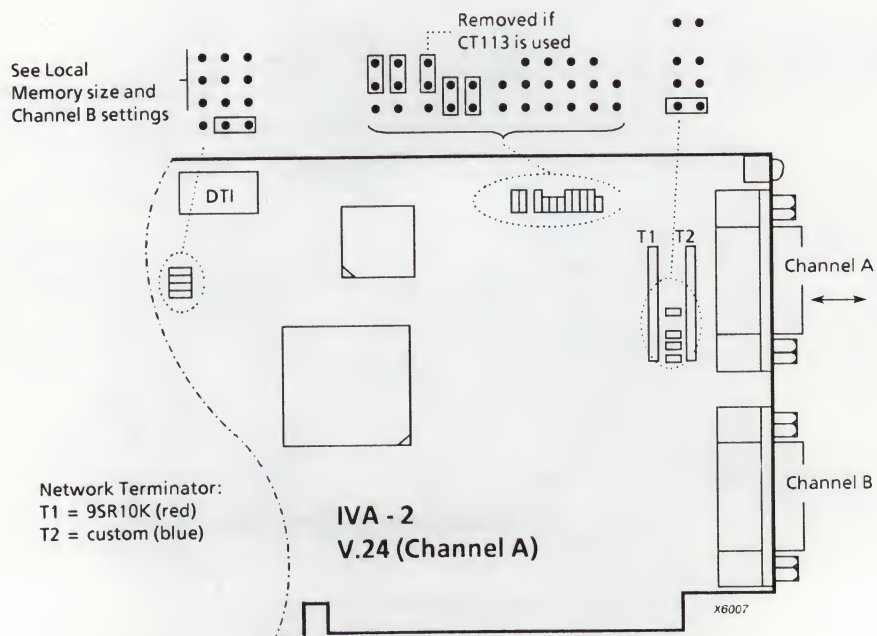
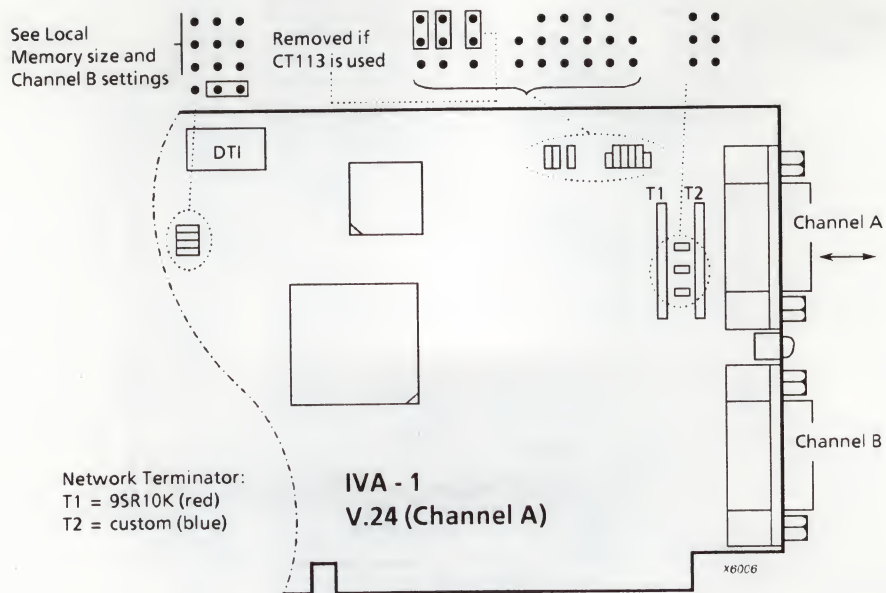


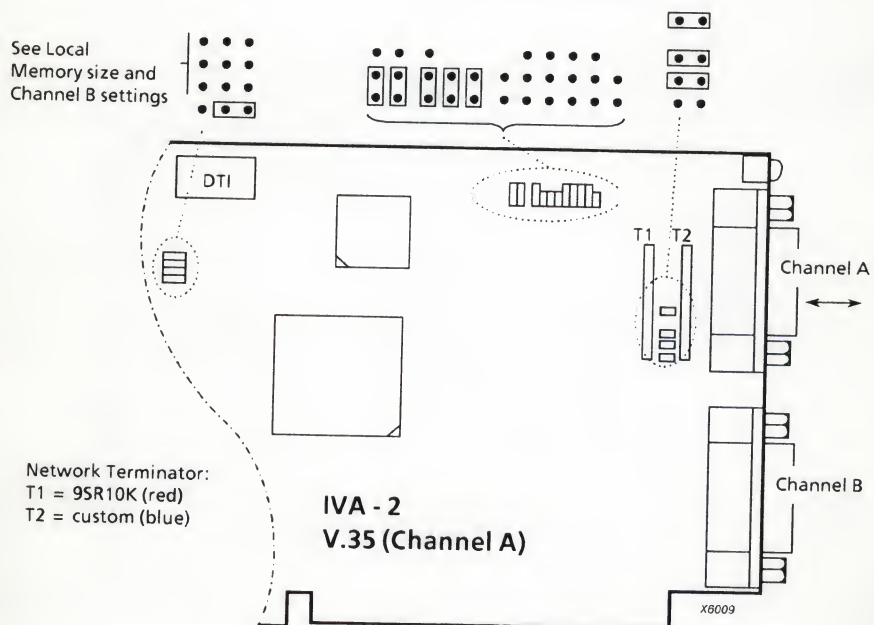
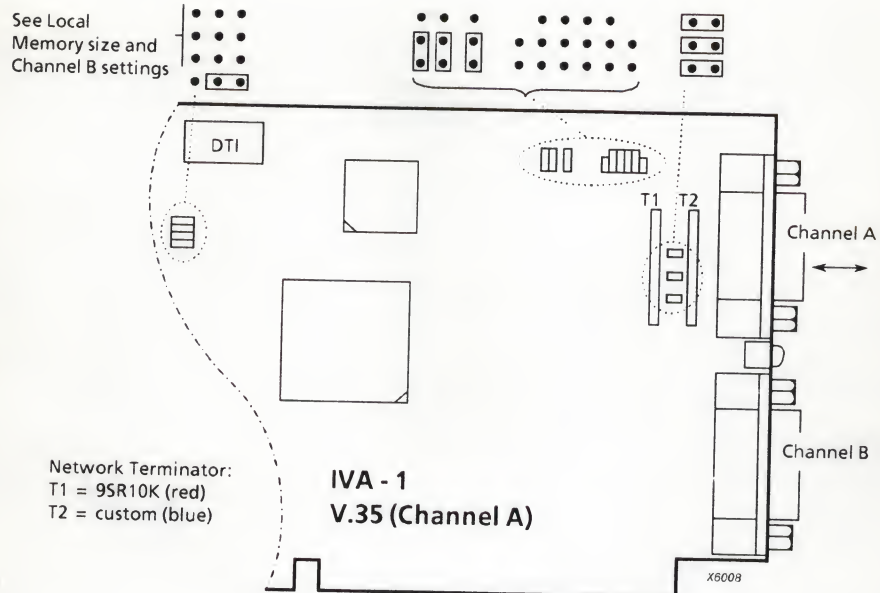


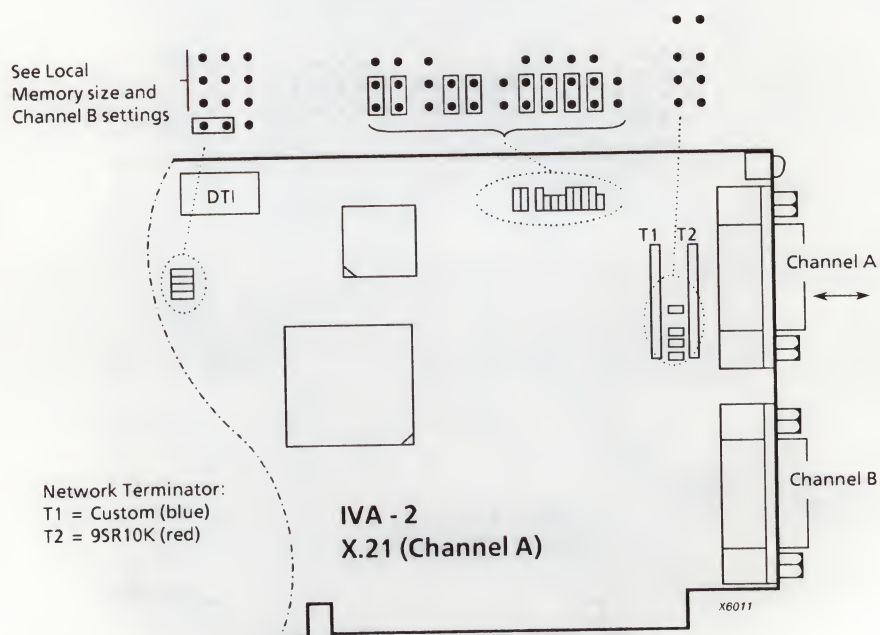
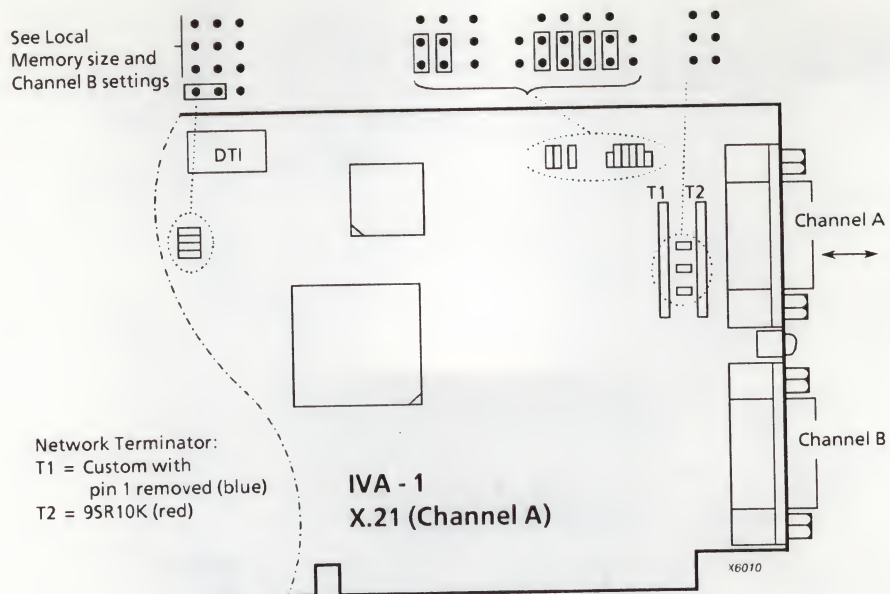








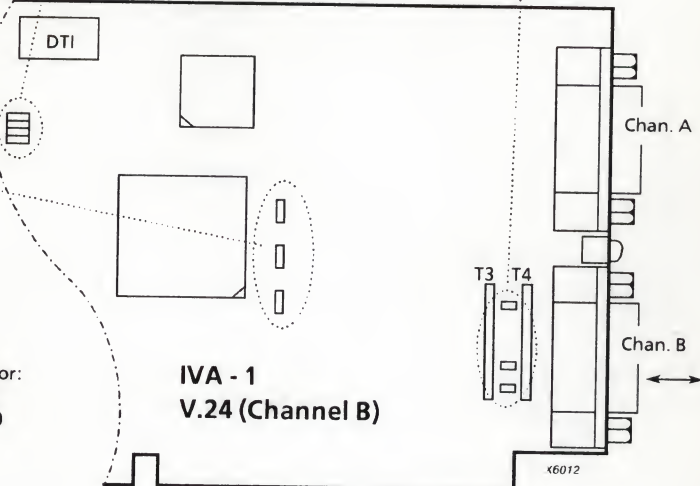




See Local  
Memory size and  
Channel B settings

Removed if  
CT113 is used

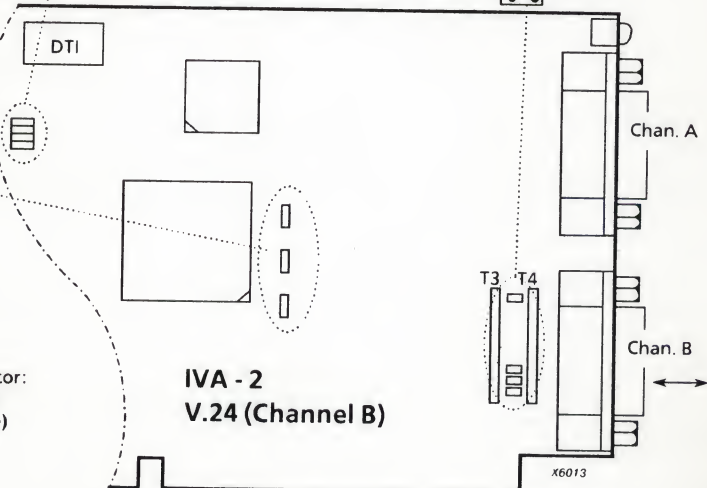
Network Terminator:  
T3 = 9SR10K (red)  
T4 = custom (blue)



See Local  
Memory size and  
Channel B settings

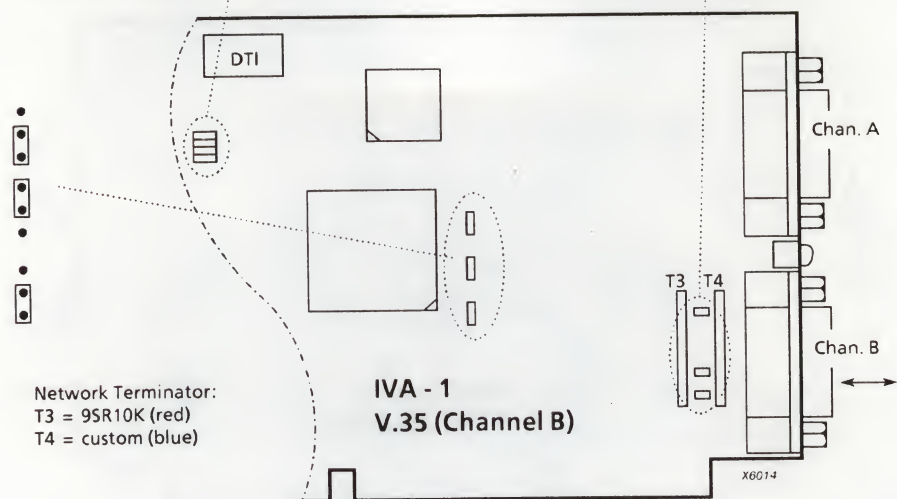
Removed if  
CT113 is used

Network Terminator:  
T3 = 9SR10K (red)  
T4 = custom (blue)

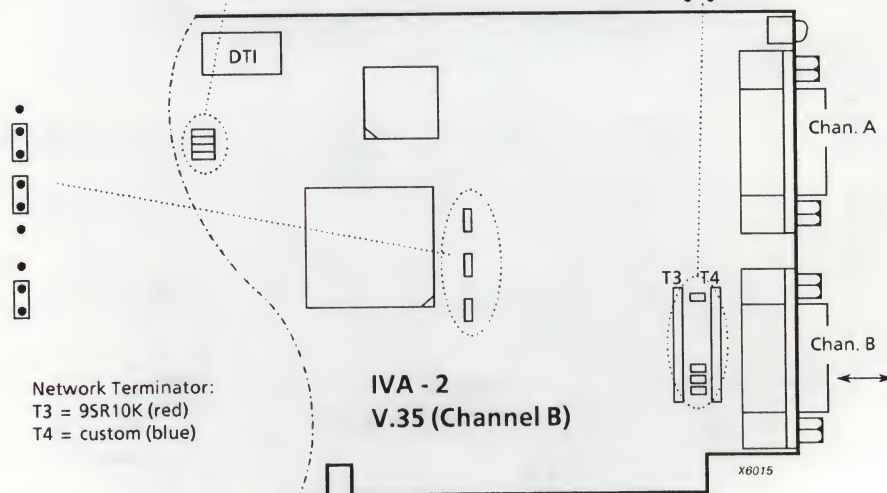




See Local  
Memory size and  
Channel B settings



See Local  
Memory size and  
Channel B settings



See Local  
Memory size and  
Channel B settings



DTI

**IVA - 1**  
**X.21 (Channel B)**

T3

T4

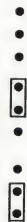
Chan. A

Chan. B

X6016

Network Terminator:  
T3 = Custom (blue)  
T4 = 95R10K (red)  
(pin 1 of Custom should  
be removed)

See Local  
Memory size and  
Channel B settings



DTI

**IVA - 2**  
**X.21 (Channel B)**

T3

T4

Chan. A

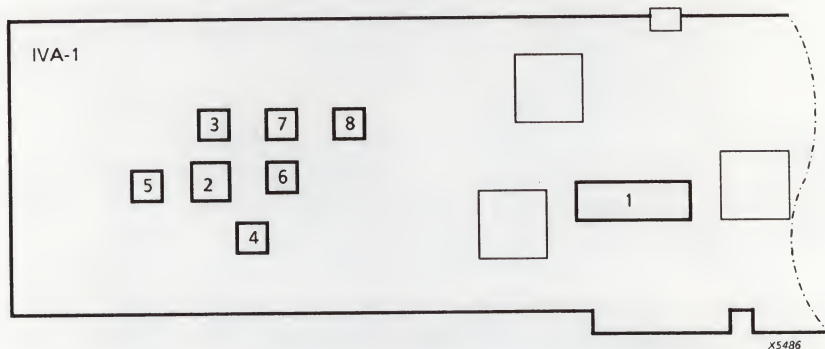
Chan. B

X6017

Network Terminator:  
T3 = Custom (blue)  
T4 = 95R10K (red)

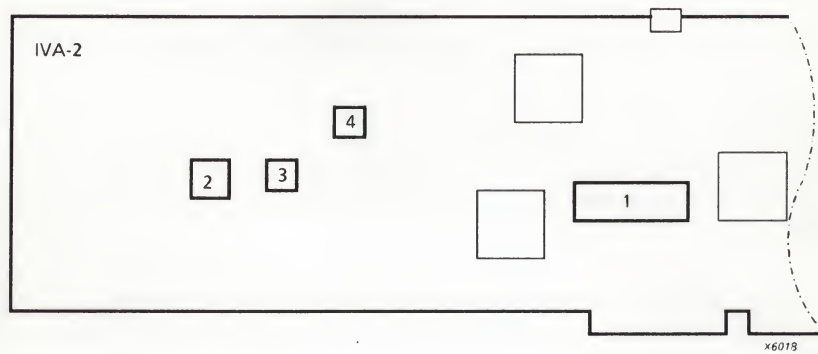
#### 15.17.4. Modification History Network Processor (IVA)

The table and figure shown below give the service codes for the EPROM and PAL devices used with the IVA-1 and show their locations respectively



LOCATION	DEVICE	12NC: 5122 194	NAME
1	EPROM 27210-002	66005	
2	GAL20V8-001	66011	PAR
3	GAL16V8-001	66021	ARB
4	GAL16V8-002	66031	LOP
5	GAL16V8-003	66041	LRW
6	GAL16V8-004	66051	OAD
7	GAL16V8-005	66061	ODT
8	GAL16V8-006	66071	SSA

The table and figure shown below give the service codes for the EPROM and PAL devices used with the IVA-2 and show their locations respectively



LOCATION	DEVICE	12NC: 5122 194	NAME
1	EPROM 27210-002	66005	
2	GAL20V8-006	66491	MEM
3	GAL16V8-007	66501	DEC
4	GAL16V8-008	66511	SWT



### 15.17.5. Installation / Maintenance Network Processor (IVA)

The IVA can be installed in an AT option slot or in an EISA option slot. Verify that the board is strapped correctly before installing it in the system (refer to 15.17.3).

### 15.17.6. Diagnostic Functions Network Processor (IVA)

The test LED on the IVA can be used as an aid to verifying the correct operation of the board and as an aid to locating faults. When the SPSEL1 strap is in the NORMAL ('0') position after power-on or CLEAR via the IO port, the IVA starts a basic self test (LED on the card is continuously on). During normal operation, the LED displays the following codes:

LED CODE	DESCRIPTION
0.25 seconds off	Basic self test started (if error, see LED error code table)
• - -	Basic self test successful; IVA entered the reset state
• • -	IVA in initial program load state
• • •	IVA received a TEST CU command, and entered the program load state
Continuously off	IVA received a SAS command, and entered the active state, if customising parameters are correct

**NOTE:**    • indicates a short flash  
              - indicates a long flash

When the SPSEL1 strap is in the self-test mode ('1') position, the self test loop will execute continuously (unless there is a DTI connection). If an error is found, the LED flashes the relevant error code (see table below). If no errors are found the LED will be off for 0.1 second in each run. If the LED stays on, it indicates that a fatal error has been detected (e.g. internal bus hangup).

ERROR CODES		
DECIMAL VALUE	LED CODE	ERROR DESCRIPTION
12	- . . .	RAM failure
13	- . . . .	Logic cell array start up failure
14	- . . . . .	Address or data line failure
18	- . . . . . . . .	Logic cell array load failure
22	- - . .	Post interrupt mechanism failure
23	- - . . .	S-processor interrupt mechanism failure
24	- - . . . .	System timer interrupt mechanism failure
32	- - - . .	S-processor, failure Z8530 channel A asynchronous
33	- - - . . .	S-processor, failure Z8530 channel A byte synchronous
34	- - - . . . .	S-processor, failure Z8530 channel A bit synchronous
35	- - - . . . . .	S-processor, failure Z8530 channel B asynchronous
36	- - - . . . . . .	S-processor, failure Z8530 channel B byte synchronous
37	- - - . . . . . . .	S-processor, failure Z8530 channel B bit synchronous
42	- - - - . .	DUART channel A failure
43	- - - - . . .	DUART channel B failure

**NOTE:**    . indicates a short flash  
               - indicates a long flash

When the SPSEL1 strap is in the self-test looped mode ('1') position and a DTI cable is connected, 19 connector tests can be executed. (refer to table on next page)

The test-configuration is shown in the figure. For all connector tests a loop connector is necessary. For the combined tests (group) two loop connectors must be used. Before starting the test, first check if the straps for the interface(s) are selected correctly (refer to channel A and B selections of section 15.17.3). Each test can be started with the command: *HEX <code>* (see table next page). The duration of each connector test is < 5 seconds.

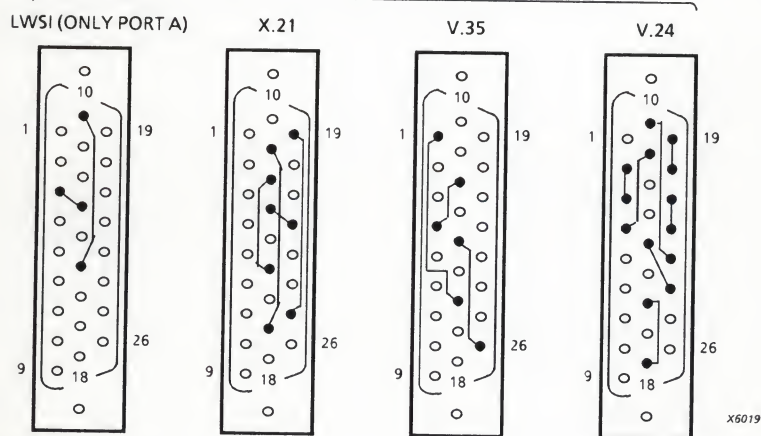
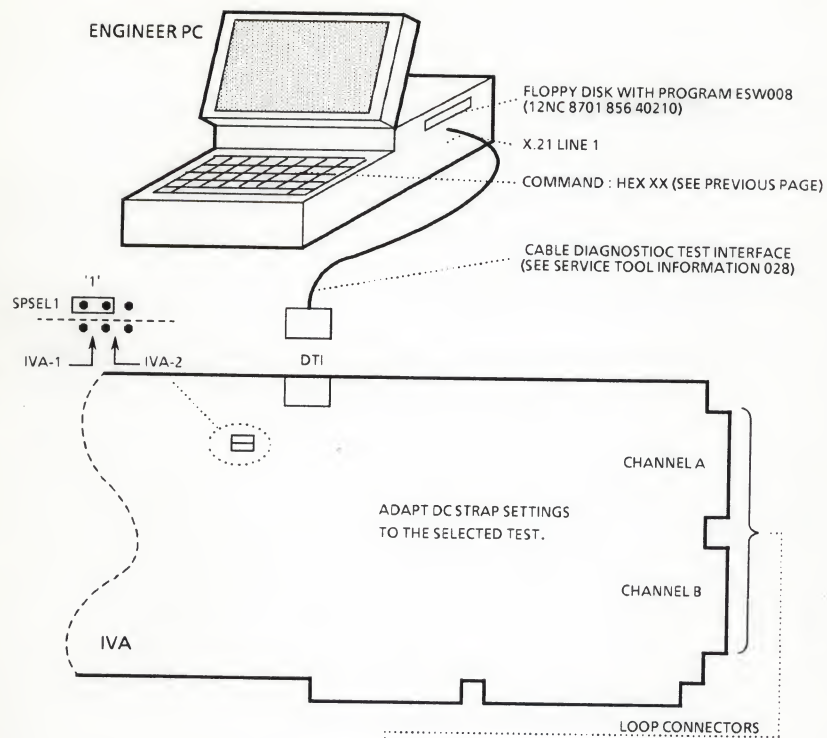
CONNECTOR TEST (check strap settings for channel A and B)	Command Code (hex)	Loop Connector (see figure next page)
	one run	
LWSI Primary (channel A) or LWSI Secondary (channel A)	91	Channel A = LWSI loop connector
X.21 (channel A)	92	Channel A = X.21 loop connector
X.21 (channel B)	93	Channel B = X.21 loop connector
V.35 (channel A)	94	Channel A = V.35 loop connector
V.35 (channel B)	95	Channel B = V.35 loop connector
V.24 (channel A)	96	Channel A = V.24 loop connector
V.24 (channel B)	97	Channel B = V.24 loop connector
X.21 (channel A + B)	A2	Channel A = X.21 loop connector Channel B = X.21 loop connector
V.35 (channel A + B)	A3	Channel A = V.35 loop connector Channel B = V.35 loop connector
V.24 (channel A + B)	A4	Channel A = V.24 loop connector Channel B = V.24 loop connector
LWSI Primary (channel A) or LWSI Secondary (channel A) and X.21 (channel B)	A5	Channel A = LWSI loop connector Channel B = X.21 loop connector
LWSI Primary (channel A) or LWSI Secondary (channel A) and V.35 (channel B)	A6	Channel A = LWSI loop connector Channel B = V.35 loop connector
LWSI Primary (channel A) or LWSI Secondary (channel A) and V.24 (channel B)	A7	Channel A = LWSI loop connector Channel B = V.24 loop connector
X.21 (channel A) V.35 (channel B)	A8	Channel A = X.21 loop connector Channel B = V.35 loop connector
X.21 (channel A) V.24 (channel B)	A9	Channel A = X.21 loop connector Channel B = V.24 loop connector
V.35 (channel A) X.21 (channel B)	AA	Channel A = V.35 loop connector Channel B = X.21 loop connector
V.35 (channel A) V.24 (channel B)	AB	Channel A = V.35 loop connector Channel B = V.24 loop connector
V.24 (channel A) X.21 (channel B)	AC	Channel A = V.24 loop connector Channel B = X.21 loop connector
V.24 (channel A) V.35 (channel B)	AD	Channel A = V.24 loop connector Channel B = V.35 loop connector

1) Test in loop mode, with stop on error

2) Test in loop mode, without stop on error

Both loop modes can be stopped with command code hex 90 and  
restarted with hex 9F.



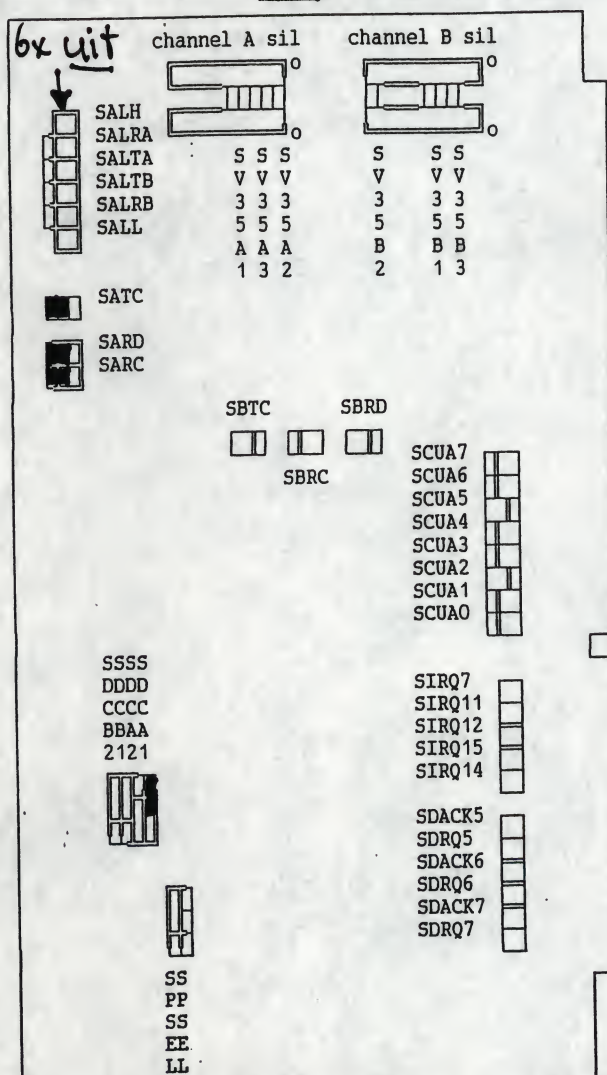


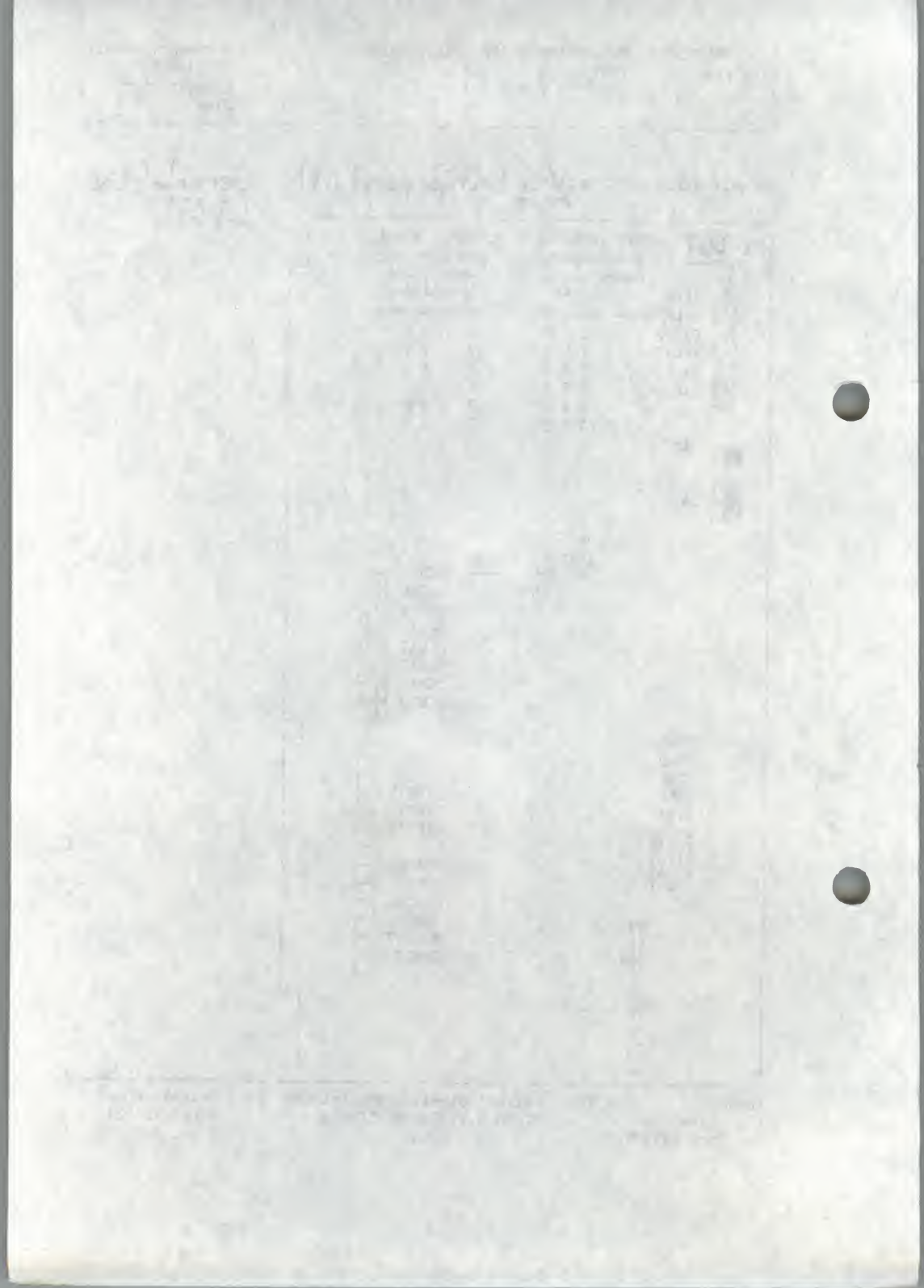




Default strap setting: V24 (altijd poort A!)

verschil tov.  
 LWSI







12NC : 5122 161 049xx

Service 12NC : 5322 216 23122

DESCRIPTION		SI nr. P9100-
04	Remove inverter for LWSI enable AXE, signal AXE must not be inverted. Signal AXEN must be replaced by AXE. Etsaway c.s. L4C2 AXEN. s.s. I9D6 AXE. Jumpby c.s. L4C2 to J9D0.25 AXE. Connect V.24 SIL to -5V. When a V.24 signal is not driven by the modem, the polarity of the signal is not correct. Jumpby s.s. M4C9 to M2C8 M5PU port A Jumpby s.s. M4B0 to M2B0.5 M5PU port B When port A is used for V.24 then a 9SR10K placed on M4C9 When port B is used for V.24 then a 9SR10K placed on M4C0 Some IVA1 boards signal 'illegal parity interrupt seen' during selftest. this interrupt is caused during a refresh cycle.	890433 890537 890541
05	Jumpby c.s. D3.75D2 (pin 12 GAL) to D1.75C6.25 (pin 21 GAL). Change firmware IVA1. prom 66001 to prom 66002. Memory selectionstraps influence DC-netwerking.	890580
06	Change firmware IVA1. prom 66002 to prom 66003. Logic cell array loadmodule (3 times) contain X21 errors.	900006
07	Change firmware IVA1. prom 66003 to prom 66004. X21 updates in logic cell array, removal of parity/coincidence, support interrupt acknowledge Z8530, V24 and X21 and loopmode selftest adaptations, illegal jump 0 trap.	900186
08	Change firmware IVA1. prom 66004 to prom 66005. At IVA2 led control is inverted versus IVA1, clean up in logic cell array loadmodules (parity, lockmode) Lock mode IVA creates write error on floppy. - Place strap SPSEL2 on IVA1 on position HIGH (down). Reset failure at low supply voltages. When the supply voltage drops to 4.75 Volt the reset circuit (NE555) does not work anymore on some IVA1 boards. RC time of trigger pulse (NE555) is too short. Change cap. on loc. I2.5D6.5 from 470pF to 2n7F. Change cap. on loc. I5.5D4 from 470pF to 2n7F. Update V.24 cable type 130. V.24 connection will not work. SubD 26p MALE, was: pin 25 <--> pin 25 to: pin 16 <--> pin 25 Connect V.24 signals 142 via 10K SIL to Vcc. When a V.24 signal is not driven by a modem, the polarity of the signal is not correct. Signal AC142 to pin 6 of SIL on M4C9. wire on s.s. M5D1 to M4D4 Signal BC142 to pin 4 of SIL on M4B0. ,, ,, ,, M5B2 to M4B3 Signal AC115 to pin 4 of SIL on M4C9. ,, ,, ,, M5D0 to M4D2 Signal BC115 to pin 9 of SIL on M4B0. ,, ,, ,, M5B9 to M4B8	900357 004 900359 004 900427 900508



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LONDON: PUBLISHED BY THE INSTITUTE.  
1890.

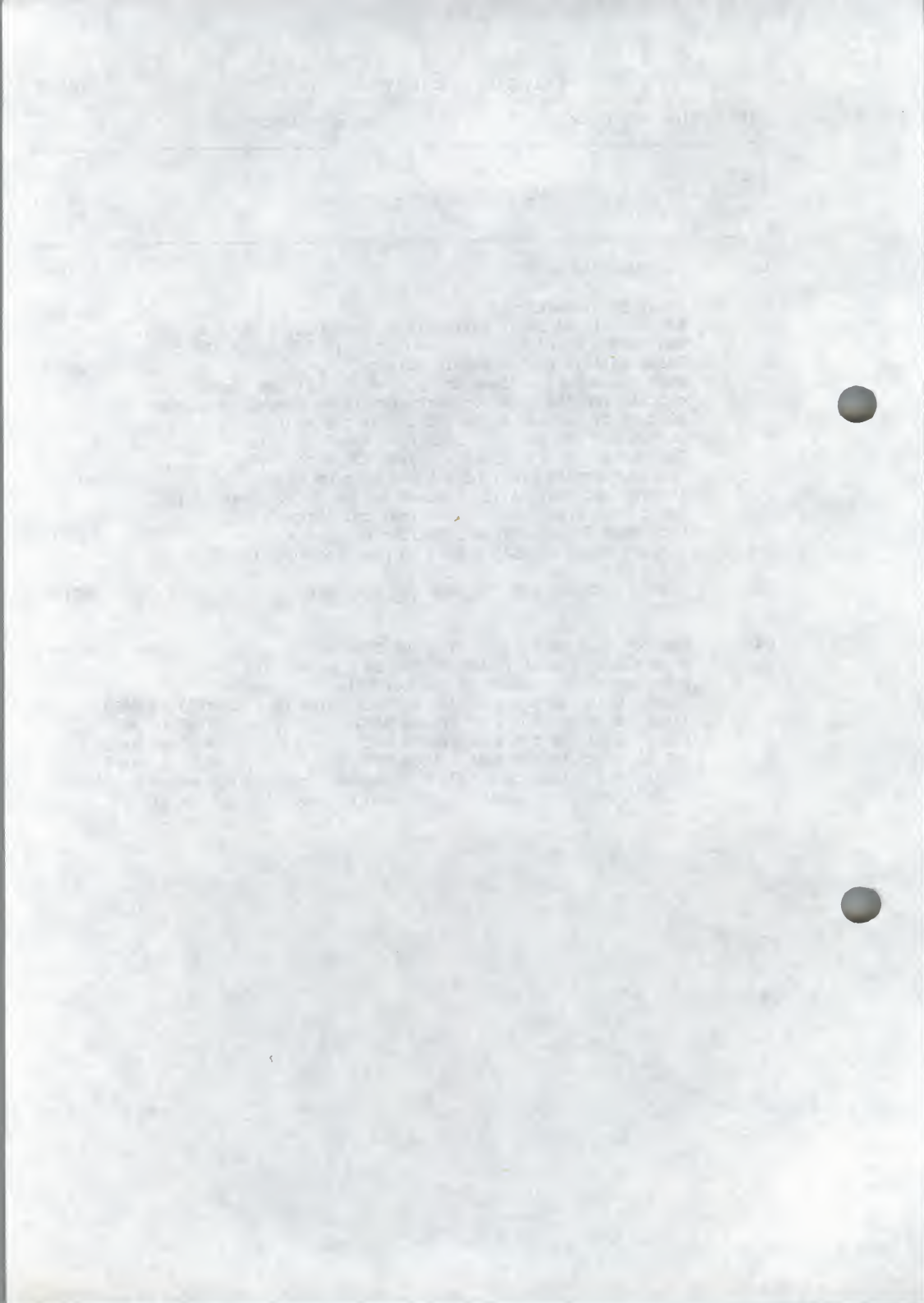
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THE ANTHROPOLOGY OF THE  
PRESENT. By H. SPENCER.

12NC : 5122 161 076xx

Service 12NC : .... ..

Last Digit 12NC	D E S C R I P T I O N	SI nr. P9000-
01	Introduction of IVA2.	900177
02	Reset of clock circuit. 680x0 will not reset correctly when the clock does not run. Ets away s.s. D6D9.5      Jumpby c.s. D6D9.5 to D5.5D9.5 Reset failure at low supply voltage. When the supply voltage drops to 4.75 Volt the reset circuit (NE555) does not work anymore on some IVA2 boards. RC time of trigger pulse (NE555) is too short. Change cap. on loc. I2.5D6.5 from 470pF to 2n7F. Change cap. on loc. I5.5D4    from 470pF to 2n7F. Change firmware IVA2. prom 66004 to prom 66005. At IVA2 led control is inverted versus IVA1, clean up in logic cell array loadmodules (parity, lockmode) Lock mode IVA creates write error on floppy. - Place strap SPSEL2 on IVA2 on position low. (UP)	900330  900358  900362
03	Change firmware IVA2.      not yet available	900471
04	Connect V.24 signals 142 via 10K SIL to Vcc. When a V.24 signal is not driven by a modem, the polarity of the signal is not correct. Signal AC142 to pin 6 of SIL on M4C9. wire on s.s. M5D1 to M4D4 Signal BC142 to pin 4 of SIL on M4B0.    "    "    "    M5B2 to M4B3 Signal AC115 to pin 4 of SIL on M4C9.    "    "    "    M5D0 to M4D2 Signal BC115 to pin 9 of SIL on M4B0.    "    "    "    M5B9 to M4B8 Update V.24 cable type 130. V.24 connection will not work. SubD 26p MALE, was: pin 25 <--> pin 25    to: pin 16 <--> pin 25	900506      900427
05		.
06		.
07		.
08		.
09		.





## Modification History of : IVA3

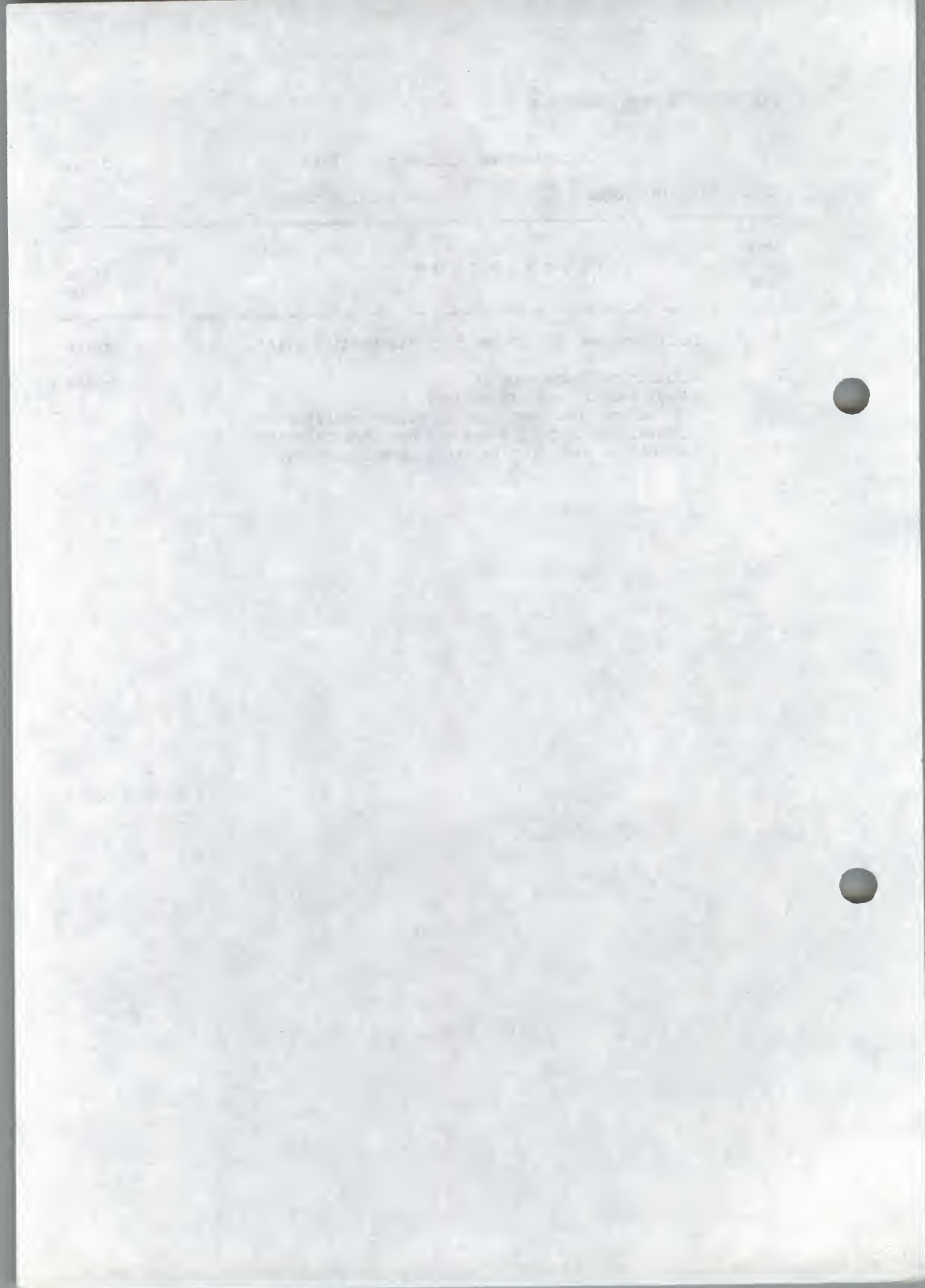
131.2

12NC : 5122 161 1260x

Service 12NC : .... ..

Last Digit 12NC	D E S C R I P T I O N	SI nr. P9100-
1	Introduce new IVA3 EPROM: 5122 194 83941 / 87421	910446
2	Addition of jumpers on IVA3. Add 3x jumper, make 1x etsaway. H4 network not connected to pullup-resistor. - Signal BSB of port B was not designed correctly. - HMEMRN to slow (parity error on motherboard).	910454-A
3		
4		
5		
6		
7		
8		
9		





## 15.18. 3C501 LAN CONTROLLER

3COM

### 15.18.1. Characteristics 3C501 LAN Controller

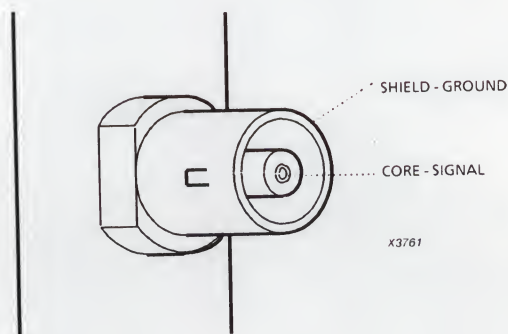
The 3C501 LAN Controller is a data-link-level network expansion board, which allows communication with other devices over an Ethernet Local Area Network. The 3C501 is fully compatible with standard Ethernet (IEEE 802.3 10BASE5) networks and Thin Ethernet (Cheapernet) (IEEE 802.3 10BASE2) networks. The 3C501 is based on a 82586 LAN Coprocessor.

## 15.18.2. Connections 3C501 LAN Controller

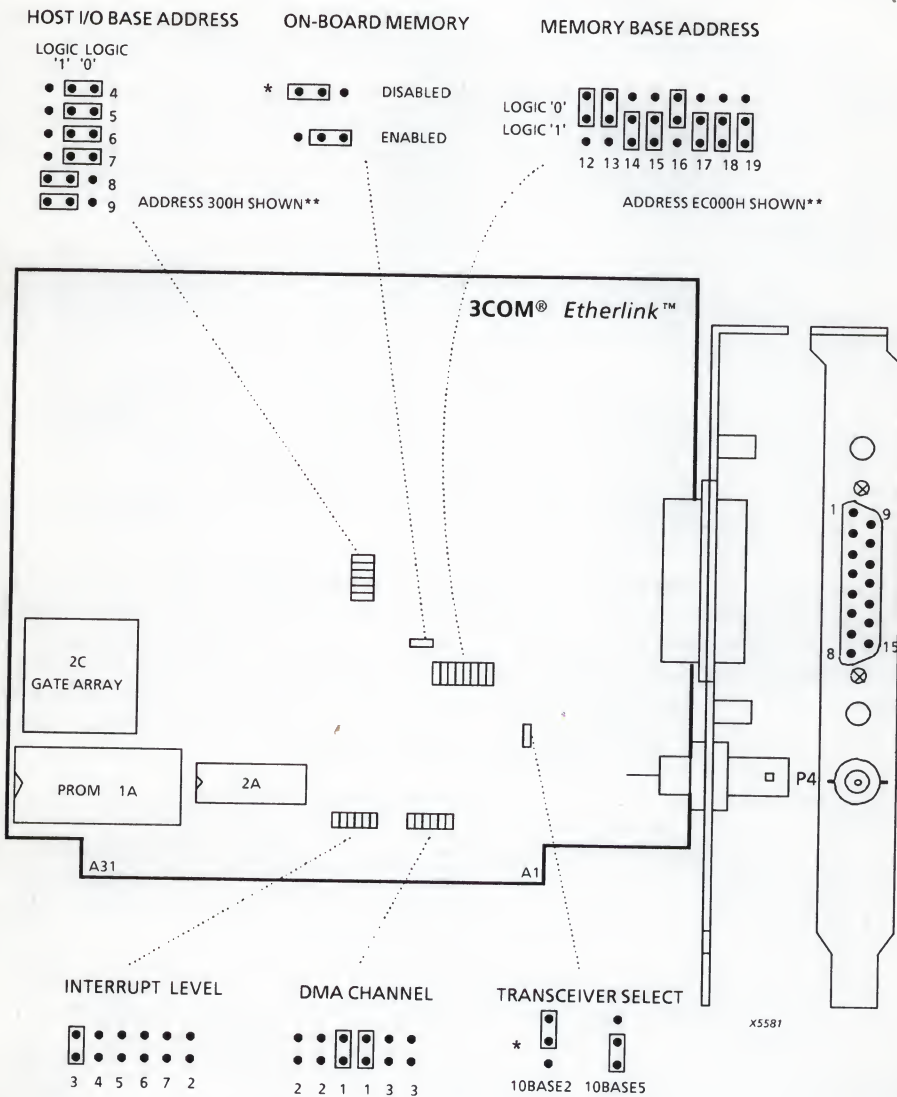
10BASE5 IEEE 802.3 Connector (15-pin Female)

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	Shield	9	Collision Presence -
2	Collision Presence +	10	Transmit -
3	Transmit +	11	Shield (Transmit)
4	Shield (Receive)	12	Receive -
5	Receive +	13	Power +12V
6	Power return	14	Shield (Voltage)
7	Reserved	15	Reserved
8	Reserved		

10BASE2 IEEE 802.3 Connector P4



### 15.18.3. Strap Settings / Adjustments 3C501 LAN Controller



NOTES: \* INDICATES DEFAULT  
 \*\* REFER TO TABLES ON FOLLOWING PAGE



Host I/O base address straps 4-9 are used to select the base I/O address of the board. The board can be strapped for any base I/O address from 000H-3F0H on any 16-byte boundary. However, it is recommended that one of the I/O addresses listed below is used.

ADDRESS	9	8	7	6	5	4	ADDRESS	9	8	7	6	5	4
200H	1	0	0	0	0	0	300H	1	1	0	0	0	0
210H	1	0	0	0	0	1	310H	1	1	0	0	0	1
220H	1	0	0	0	1	0	320H	1	1	0	0	1	0
230H	1	0	0	0	1	1	330H	1	1	0	0	1	1
240H	1	0	0	1	0	0	340H	1	1	0	1	0	0
250H	1	0	0	1	0	1	350H	1	1	0	1	0	1
260H	1	0	0	1	1	0	360H	1	1	0	1	1	0
270H	1	0	0	1	1	1	370H	1	1	0	1	1	1
280H	1	0	1	0	0	0	380H	1	1	1	0	0	0
290H	1	0	1	0	0	1	390H	1	1	1	0	0	1
2A0H	1	0	1	0	1	0	3A0H	1	1	1	0	1	0
2B0H	1	0	1	0	1	1	3B0H	1	1	1	0	1	1
2C0H	1	0	1	1	0	0	3C0H	1	1	1	1	0	0
2D0H	1	0	1	1	0	1	3D0H	1	1	1	1	0	1
2E0H	1	0	1	1	1	0	3E0H	1	1	1	1	1	0
2F0H	1	0	1	1	1	1	3F0H	1	1	1	1	1	1

The memory base address for the optional EtherStart PROM (1A) is selected by memory base address straps 12-19, as shown below. When the EtherStart PROM is installed, the on-board memory strap must be in the enabled position. The board can be strapped for any memory address from 00000H-FF000H on any 4 Kbyte boundary. However, it is recommended that one of the following addresses is used and not the default address as shipped from the factory which is EC000H. In systems which contain a 128 Kbyte BIOS, this default address will cause a conflict.

ADDRESS	12	13	14	15	16	17	18	19	ADDRESS	12	13	14	15	16	17	18	19
C8000H	0	0	0	1	0	0	1	1	D4000H	0	0	1	0	1	0	1	1
C9000H	1	0	0	1	0	0	1	1	D5000H	1	0	1	0	1	0	1	1
CA000H	0	1	0	1	0	0	1	1	D6000H	0	1	1	0	1	0	1	1
CB000H	1	1	0	1	0	0	1	1	D7000H	1	1	1	0	1	0	1	1
CC000H	0	0	1	1	0	0	1	1	D8000H	0	0	0	1	1	0	1	1
CD000H	1	0	1	1	0	0	1	1	D9000H	1	0	0	1	1	0	1	1
CE000H	0	1	1	1	0	0	1	1	DA000H	0	1	0	1	1	0	1	1
CF000H	1	1	1	1	0	0	1	1	DB000H	1	1	0	1	1	0	1	1
D0000H	0	0	0	0	1	0	1	1	DC000H	0	0	1	1	1	0	1	1
D1000H	1	0	0	0	1	0	1	1	DD000H	1	0	1	1	1	0	1	1
D2000H	0	1	0	0	1	0	1	1	DE000H	0	1	1	1	1	0	1	1
D3000H	1	1	0	0	1	0	1	1	DF000H	1	1	1	1	1	0	1	1

### **15.18.5. Installation / Maintenance 3C501 LAN Controller**

The 3C501 may be installed in any of the option board slots. Put the straps in the desired positions. Ensure that there is no conflict in board addresses or interrupts used with any other options installed. Power on the system. Run the 3C501 diagnostic program (3C501.EXE) to confirm you have installed the board correctly.

#### **10BASE5 and 10BASE2 Networks**

The 3C501 operates correctly only with Medium Attachment Units (MAUs) (AC-coupled transceivers) that are compatible with IEEE 802.3 and / or Ethernet V1.0 specifications. The 3C501 is connected with a BNC connector in a 10BASE2 network and is fully compatible with Thin Ethernet (Cheapernet) IEEE 802.3 10BASE2 networks. For full details of the 10BASE5 and 10BASE2 connections, refer to 15.12.5.

### 15.18.6. Diagnostic Functions 3C501 LAN Controller

Copy the diagnostic file from the diskette labelled "EtherLink Diagnostic Software" to any directory. This diskette contains only one file; 3C501.EXE which is the executable diagnostics file.

#### Diagnostic Program

Type 3C501 <RETURN> with one or more parameters to run the diagnostic program. The complete syntax for the command is; 3C501 [#][A][E][L][-I][-D][Ix][Dx][Bxxx]

The default parameter (to select test 1 up to 4) if only a loopback connector (a T-connector and two terminators) is attached and the default strap setting is used is L. So the command will be '3C501 L' <RETURN>.

The tests available are:-

- |                |   |
|----------------|---|
| Internal Test: | 1. Preliminary test.                              |
| Network Tests: | 2. DMA/Interrupt test                             |
|                | 3. Packet test                                    |
|                | 4. Recognizer test                                |
|                | 5. Message Exchange test (Needs a Echo Server)    |
|                | 6. Passive Receive test (Needs an active Network) |
|                | 7. Echo Server test (Simulates a Echo Server).    |

#### Possible LAN errors detected by diagnostics

Hard controller failure  
Probable controller failure  
Probable network failure  
Probable server failure  
Test software failure  
Uncertain origin failure.

Refer to the EtherLink Installation Guide, delivered with the board, for more details.

## **15.19. NE1000A LAN CONTROLLER**

### **15.19.1. Characteristics NE1000A LAN Controller**

The NE1000A LAN Controller (or 810-160-001) is a data-link-level network expansion board, which allows communication with other devices over an Ethernet Local Area Network. The NE1000A is fully compatible with standard Ethernet (IEEE 802.3 10BASE5) networks and Thin Ethernet (Cheapernet) (IEEE 802.3 10BASE2) networks.

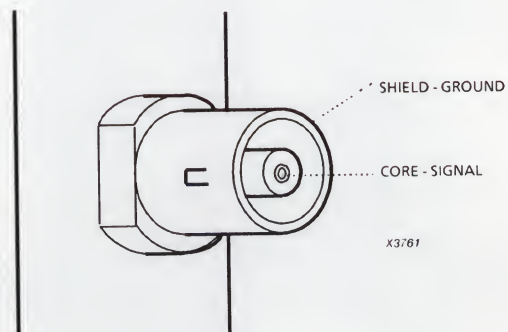


## 15.19.2. Connections NE1000A LAN Controller

10BASE5 IEEE 802.3 Connector J1 (15-pin Female)

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	Shield	9	Collision Presence -
2	Collision Presence +	10	Transmit -
3	Transmit +	11	Shield (Transmit)
4	Shield (Receive)	12	Receive -
5	Receive +	13	Power +12V
6	Power return	14	Shield (Voltage)
7	Reserved	15	Reserved
8	Reserved		

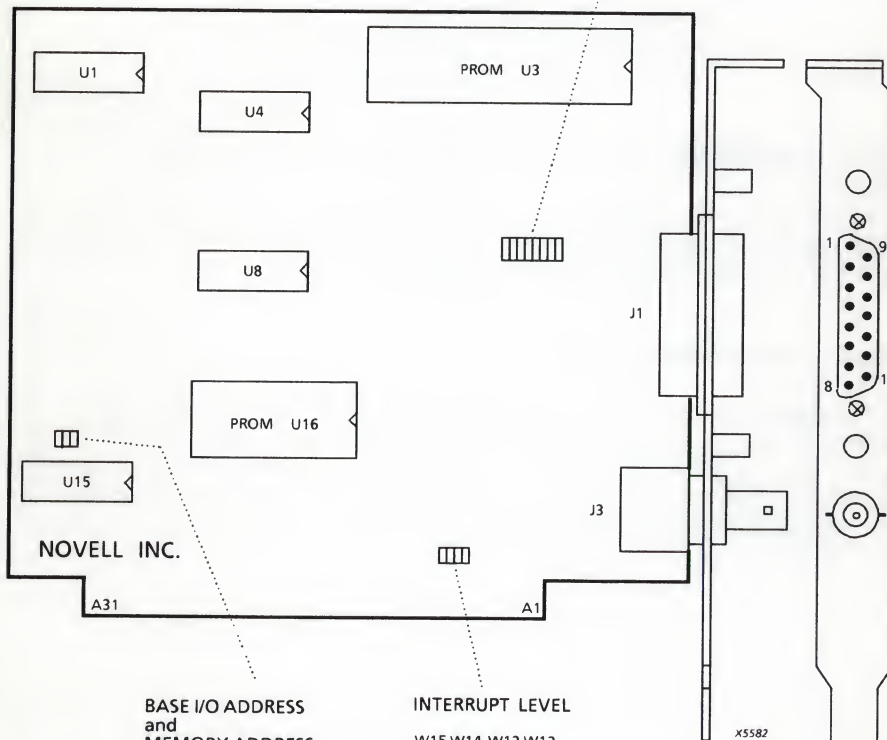
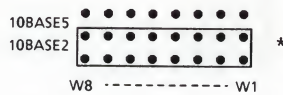
10BASE2 IEEE 802.3 Connector J3



### 15.19.3. Strap Settings / Adjustments NE1000A LAN Controller

NOTE: \* INDICATES DEFAULT  
\*\* REFER TO TABLE ON  
FOLLOWING PAGE

#### ETHERNET JUMPER BLOCK



#### BASE I/O ADDRESS and MEMORY ADDRESS

ADDRESS \*  
300H \*\*  
SHOWN W9 W10 W11

#### INTERRUPT LEVEL

W15 W14 W13 W12  
\* IRQ3  
IRQ2  
IRQ4  
IRQ5

Straps W9, W10 and W11 are used to select the base I/O address and the memory address for a remote reset PROM (U16) when installed as shown below.

I/O ADDRESS	W9	W10	W11	MEMORY ADDRESS (RESET PROM)
360H	out	out	out	
360H	out	out	in	D4000H
320H	out	in	out	
320H	out	in	in	CC000H
340H	in	out	out	
300H	in	in	out	
300H	in	in	in	C8000H

#### 15.19.5. Installation / Maintenance NE1000A LAN Controller

The NE1000A may be installed in any of the option board slots. Put the straps in the desired positions. Ensure that there is no conflict in board addresses or interrupts used with any other options installed. Power on the system.

#### 10BASE5 and 10BASE2 Networks

The NE1000A operates correctly only with Medium Attachment Units (MAUs) (AC-coupled transceivers) that are compatible with IEEE 802.3 and / or Ethernet V1.0 specifications in a 10BASE5 network. The NE1000A is connected with a BNC connector in a 10BASE2 network and is fully compatible with Thin Ethernet (Cheapernet) IEEE 802.3 10BASE2 networks. For full details of the 10BASE5 and 10BASE2 connections, refer to 15.12.5.

## **15.20. NE2000 LAN CONTROLLER**

### **15.20.1. Characteristics NE2000 LAN Controller**

The NE2000 LAN Controller (or 810-149-001) is a non-intelligent Ethernet Controller, that allows communication with other devices over an Ethernet Local Area Network. The NE2000 is fully compatible with standard Ethernet (IEEE 802.3 10BASE5) networks and Thin Ethernet (Cheapernet) (IEEE 802.3 10BASE2) networks. This board is designed for use with only PC AT-compatible buses.

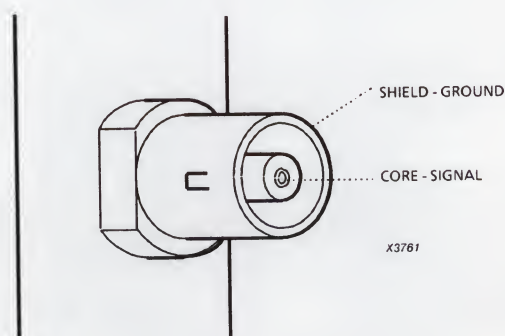


## 15.20.2. Connections NE2000 LAN Controller

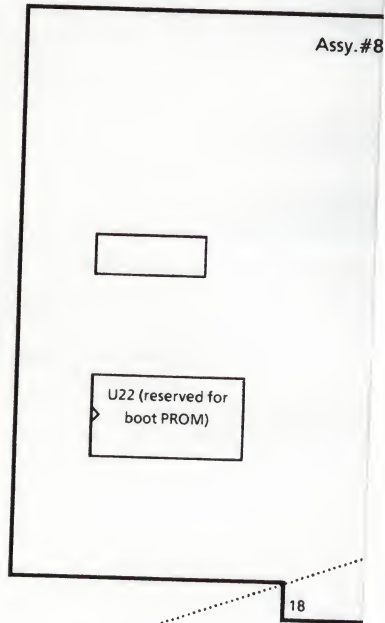
10BASE5 IEEE 802.3 Connector J4 (15-pin Female)

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	Shield	9	Collision Presence -
2	Collision Presence +	10	Transmit -
3	Transmit +	11	Shield (Transmit)
4	Shield (Receive)	12	Receive -
5	Receive +	13	Power +12V
6	Power return	14	Shield (Voltage)
7	Reserved	15	Reserved
8	Reserved		

10BASE2 IEEE 802.3 Connector J3



### 15.20.3. Strap Settings / Adjustment



Timing  
Compatibility  
Rev G or later only

- Strap must always be out



W16

Straps W9, W10 and W11 are used to select the base I/O address and the memory address for the Boot PROM (U22) when installed as shown below.

I/O ADDRESS	W9	W10	W11	MEMORY ADDRESS (BOOT PROM)
360H	out	out	out	
320H	out	in	out	
320H	out	in	in	CC000H
340H	in	out	out	
340H	in	out	in	D0000H
300H	in	in	out	
300H	in	in	in	C8000H

#### 15.20.4. Modification History NE2000 LAN Controller

The table below gives an overview of the modification history for the NE2000.

NE2000 REVISION LEVEL	TIMING COMPTABILITY MAINTAINED BY	PAL IN SOCKET U7
Rev E or Rev F	PAL in socket U7	814-335-002
Rev G or later	strap W16	814-336-00xx

### **15.20.5. Installation / Maintenance NE2000 LAN Controller**

The NE2000 may be installed only in an AT option board slot. Put the straps in the desired positions. Ensure that there is no conflict in board addresses or interrupts used with any other options installed. Power on the system.

#### **10BASE5 Networks**

The NE2000 operates correctly only with Medium Attachment Units (MAUs) (AC-coupled transceivers) that are compatible with IEEE 802.3 and / or Ethernet V1.0 specifications in a 10BASE5 network. The NE2000 is connected with a BNC connector in a 10BASE2 network and is fully compatible with Thin Ethernet (Cheapernet) IEEE 802.3 10BASE2 networks. For full details of the 10BASE5 and 10BASE2 connections, refer to 15.12.5.

#### **P3202**

Some timing problems with NE2000/P3202 can be solved by inserting a PAL (12NC 5107 299 67651) at position U70 on the Main PCB. Strap U11 must be inserted to enable the PAL on the main PCB.

When any level of NE2000 is installed, strap W12 on the main board should be open (insert one wait state for RAM).

#### **P3230**

Do not use an NE2000 in a P3230





## 15.21. EICONCARD/PC

### 15.21.1. Characteristics EiconCard/PC

The EiconCard/PC is an intelligent communication card for the IBM compatible XT, AT, PS/2 (model 30) and is supplied with diagnostics software.

The board features a Motorola 68008 microprocessor with 256 KBytes or 512KBytes of memory and a V.24 (RS-232-C) port. The interrupt level is software selectable and can have one of the levels 2 through 7. Also the memory address is software selectable. One of the 14 I/O addresses can be selected via on-board switches.

The EiconCard/PC can be connected to a modem or other DCE's (Data Circuit-terminating Equipment) via a RS-232-C modem cable. The EiconCard/PC can also be connected to another EiconCard/PC or other DTE's (Data Terminal Equipment) via a null-modem cable. The null-modem cable may be upto 2.5m (8ft.) long. Using this null-modem cable the speed can be 64Kbps (full duplex) maximum. NR, NRZR and FM data encoding is possible.

Supported software :

- X.25 Gateway
- QLLC 3270 Gateway
- QLLC 5250 Gateway
- X.25/NetWare Bridge
- X.25/NetBIOS Bridge
- APPC/LU 6.2 support
- Access/SDLC (3270, 5250 support)
- Access API (X.25, 3270 QLLC, 5250 QLLC, 3270 SDLC, 5250 SDLC support)

### 15.21.2. Connections EiconCard/PC

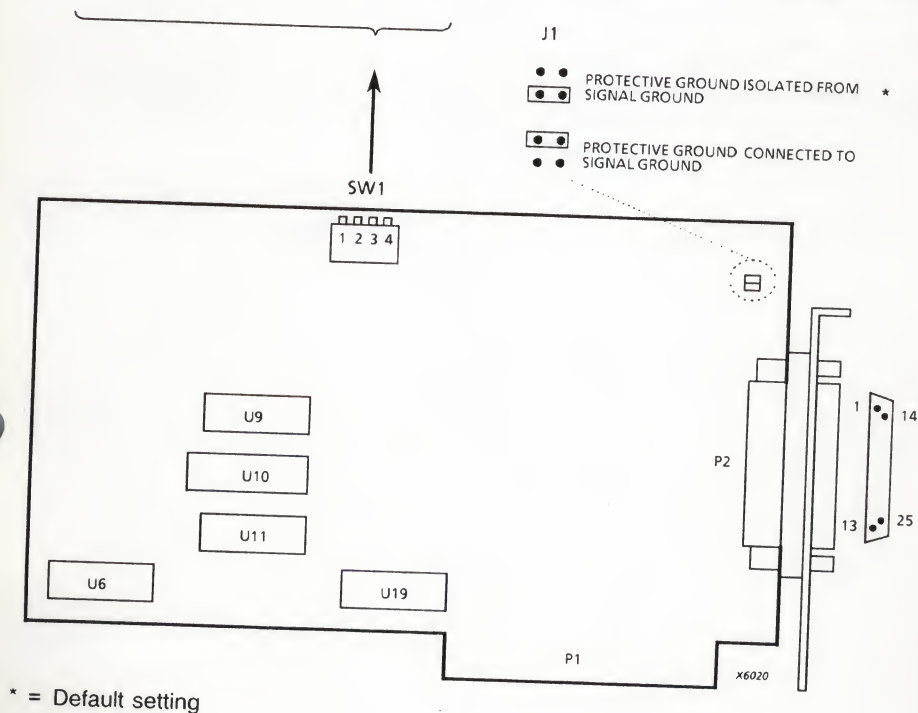
The V.24 port incorporates a standard DB-25 (female) connector.

V.24 Interface Connector :

PIN	SIGNAL NAME	CCITT V.24 circuit	PIN	SIGNAL NAME	CCITT V.24 circuit
1	Protected Ground (PGND)	-	14	Not used	
2	Transmit Data (TxD)	103	15	Transmit Clock from modem (TxCLK)	114
3	Received Data (RxD)	104	16	Not used	
4	Ready To Send (RTS)	105	17	Received Clock (RxCLK)	115
5	Clear To Send (CTS)	106	18	Local loopback act. (TEST)	141
6	Data Set Ready (DSR)	107	19	Not used	
7	Signal Ground (SGND)	102	20	Data Terminal Ready (DTR)	108
8	Data Carrier Detect (DCD)	109	21	Remote loopback (RLB)	140
9	Not used		22	Ring Indicator (RI)	125
10	Not used		23	Data Signal Rate Selector (DRS)	111
11	Standby indicator (STBY)		24	Transmit Clock to modem (CLK)	113
12	Not used		25	Test Indicator (TI)	142
13	Not used				

### 15.21.3. Strap Settings / Adjustments EiconCard/PC

SW1-1	SW1-2	SW1-3	SW1-4	I/O ADDRESS SELECTION
OFF	OFF	OFF	OFF	278h (I.O address first or only card)
OFF	OFF	OFF	ON	280h (I.O address first or only card)
OFF	OFF	ON	OFF	378h (I.O address first or only card)
OFF	OFF	ON	ON	380h (I.O address first or only card)
OFF	ON	OFF	OFF	380h (I.O address first or only card) *
OFF	ON	OFF	ON	388h (I.O address first or only card)
OFF	ON	ON	OFF	390h (I.O address first or only card)
OFF	ON	ON	ON	398h (I.O address first or only card)
ON	OFF	OFF	OFF	678h (I.O address second card together with 278h)
ON	OFF	OFF	ON	680h (I.O address second card together with 280h)
ON	OFF	ON	OFF	778h (I.O address second card together with 378h)
ON	OFF	ON	ON	780h (I.O address second card together with 380h)
ON	ON	OFF	OFF	780h (I.O address second card together with 380h)
ON	ON	OFF	ON	788h (I.O address second card together with 388h)
ON	ON	ON	OFF	790h (I.O address second card together with 390h)
ON	ON	ON	ON	798h (I.O address second card together with 398h)



\* = Default setting



### **15.21.5. Installation / Maintenance EiconCard/PC**

The board can be plugged in either a XT or AT slot. Verify the strap- and switch settings to avoid address conflicts with other boards already installed. Also check the interrupt level (software selectable).

If one EiconCard must be installed always use a primary address. If two or more cards must be installed, for every board installed at a primary I/O address, another board can be installed at the secondary I/O address belonging to that primary I/O address. This will save address locations since primary and secondary I/O addresses occupy the same position in the I/O space of the PC. When a conflict occurs both the addresses of the EiconCards at the primary and at the secondary I/O address must be changed. For switch settings refer to sub-section 15.21.3..

Run the "INSTALL" program to configure the X25NET driver for the card and to copy the necessary software to the proper disk. Changing the interrupt level or memory address afterwards must be done via the option "CONFIG". For changing of the I/O address afterwards also the dip-switch settings must be changed.

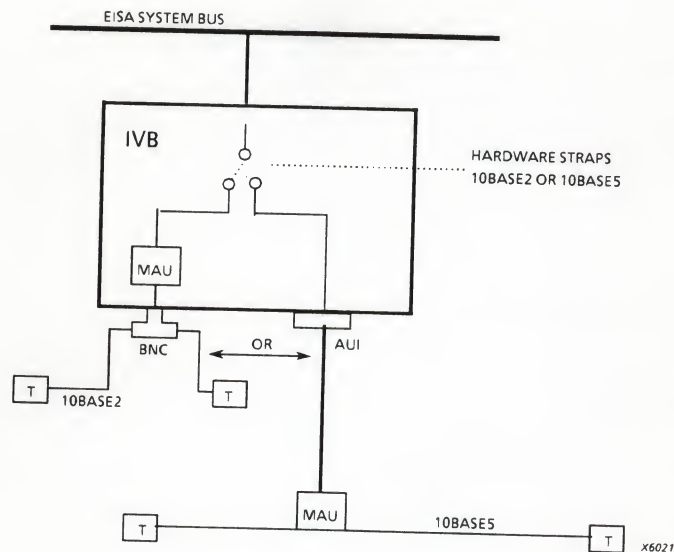
### **15.21.6. Diagnostic Functions EiconCard/PC**

The diagnostics software supplied with every board contains a test program that will verify the EiconCard/PC's integrity. For more details consult the user's guide.

## 15.22. ENHANCED LAN PROCESSOR ELP/EISA (IVB)

### 15.22.1. Characteristics Enhanced LAN Processor ELP/eisa (IVB)

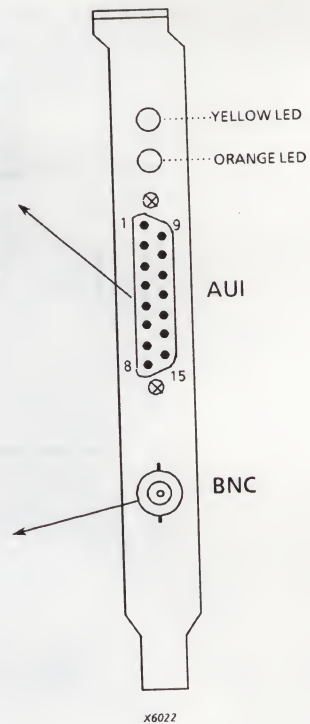
The Enhanced LAN Processor ELP/eisa (IVB) is used to support high performance transmission of data on Ethernet Local Area Networks (10BASE2 or 10BASE5).



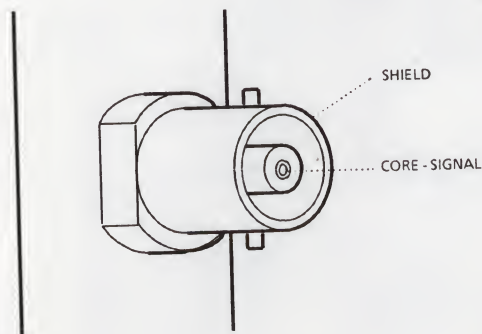
## 15.22.2. Connections Enhanced LAN Processor ELP/eisa (IVB)

AUI Connector (10BASE5)

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	Shield (Control In)	9	Control In-
2	Control In +	10	Transmit -
3	Transmit +	11	Shield (Transmit)
4	Shield (Receive)	12	Receive -
5	Receive +	13	Power +12V
6	Power return	14	Shield (Voltage)
7	not connected	15	not connected
8	Shield		



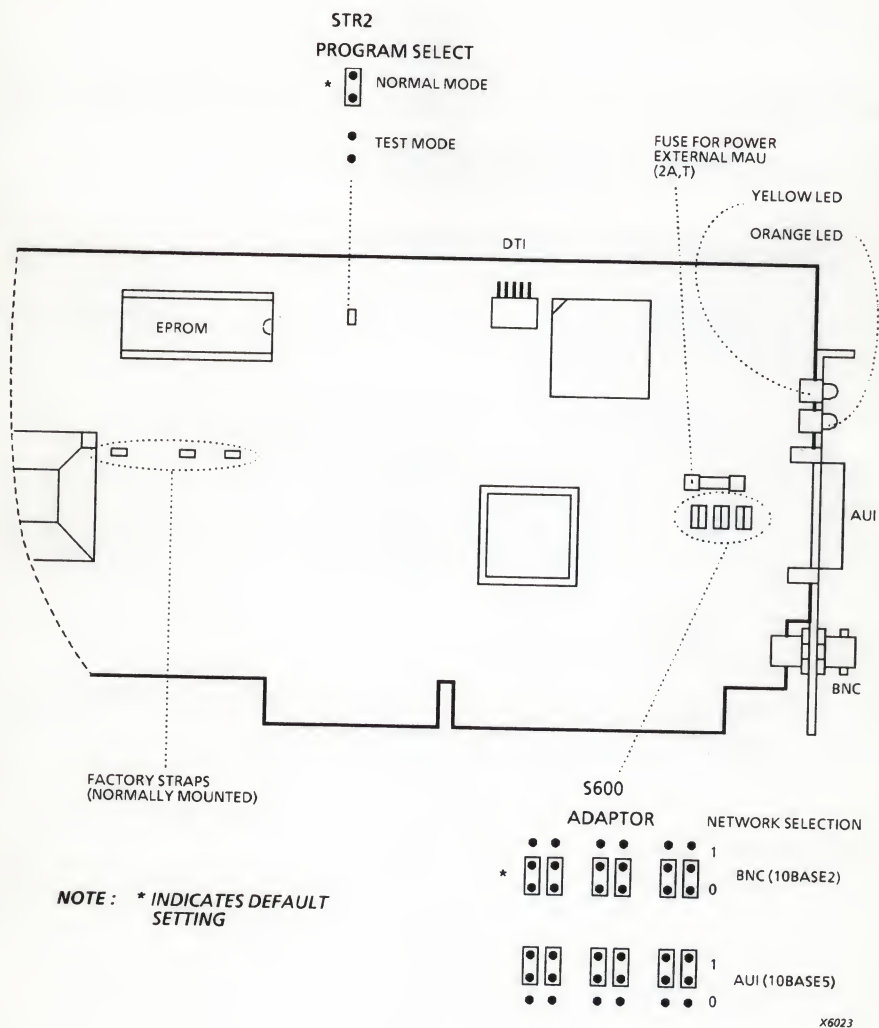
BNC Connector (10BASE2)



DTI Connector (test)

PIN	SIGNAL NAME	I/O	PIN	SIGNAL NAME	I/O
A01	CONNECTN	I	B01	SDUTN	O
A02	L		B02	SDTUN	I
A03	L		B03	RESETN	I
A04	L		B04		
A05	DUMMY		B05	L	

### 15.22.3. Strap Settings / Adjustments Enhanced LAN Processor ELP/eisa (IVB)





### 15.22.5. Installation / Maintenance Enhanced LAN Processor ELP/eisa (IVB)

The IVB must be installed in an EISA option slot. Verify that the board is strapped correctly before installing it in the system (refer to 15.22.3).

### 15.22.6. Diagnostic Functions Enhanced LAN Processor ELP/eisa (IVB)

Two diagnostic LEDs are mounted at the front of the board:

- Orange LED:  
signalling basic error (ON = ERROR, OFF = NO ERROR)
- Yellow LED:  
1) in normal operation the yellow LED is signalling the state of the IVB board as shown in the table below:

YELLOW LED CODE	DESCRIPTION
• - -	Basic self test successful; IVB entered the reset state.
• • •	IVB received a TEST CU command, and entered the program load state.
Continuously off	IVB received a SAS command, and entered the active state, if customising parameters are correct.

**NOTE:**    • indicates a short flash  
              - indicates a long flash

- 2) if orange LED is not going OFF after power-on, then the yellow LED is signalling detailed error information as shown in the table on the following page:

DTI TEST NUMBER (hex)	ERROR CODES OF BASIC SELF TEST		
	DECIMAL VALUE	YELLOW LED CODE	ERROR DESCRIPTION
-	11	- .	DRAM failure
-	12	- . .	DRAM data/address line
1	21	- - .	SRAM basic
2	22	- - . .	SRAM data/address line
3	31	- - - .	UART
4	32	- - - . .	Timer
5	33	- - - . . .	Post processing
8	34	- - - . . . .	EEPROM initialisation
8	35	- - - . . . . .	EEPROM checksum
6	42	- - - - . .	Local BMIC access
7	43	- - - - . . .	Co-processor internal loop back
7	44	- - - - . . . .	Co-processor external loop back
7	45	- - - - . . . . .	Co-processor interrupt mechanism
7	46	- - - - . . . . .	LAN-Coprocessor

## TEST PROCEDURES

### Power-on

After power-on the IVB starts the firmware self test. During this test the orange LED is ON. At the end of the self test the orange LED is switched OFF if the test was successful. If the self test was not successful, the orange LED stays ON and the yellow LED flashes an error code as shown in the table above.

### Strap STR2 removed

When the strap STR2 is removed, the power-on self test is looped continuously.

### DTI interface

If an Engineer PC with the program ESW008 is connected to the DTI interface (only reachable by removing the cover of the system cabinet) and the strap STR2 is removed, then the basic self test with additional tests can be executed as shown in the table below:

DTI TEST NUMBER (hex)	TESTED ITEM
20	DRAM basic
21	DRAM data/address
22	EEPROM access mechanism
23	EISA-bus (main) memory access
24	Medium access transmit
25	Medium access receive
30	Compilation of tests: 1-8, 20, 21 and 23
31	Compilation of tests: 1-8, 20 and 21



## 15.23. WD TOKENCARD / TOKENCARD WS LAN ADAPTER

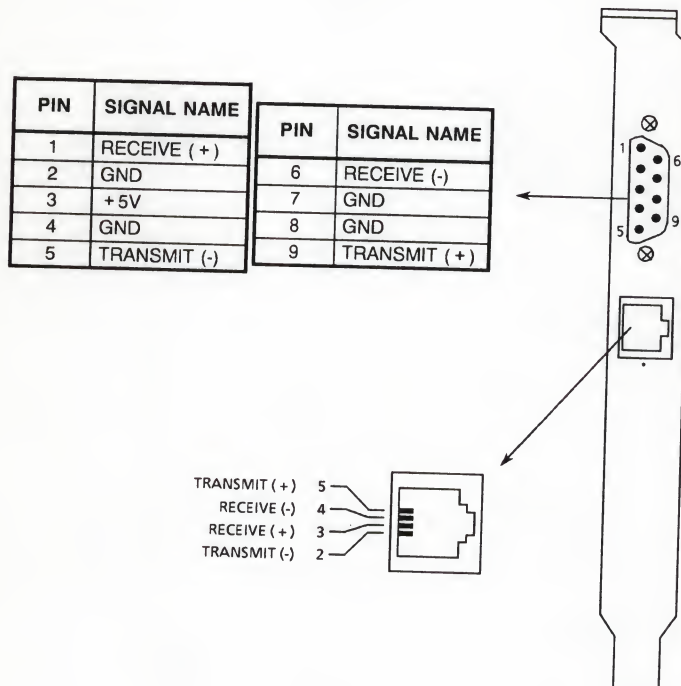
### 15.23.1. Characteristics WD TokenCard / TokenCard WS LAN ADAPTER

The Western Digital Token Ring local area network controller cards enable Philips PC to connect to IBM's token ring network.

Two versions of the Tokencard are offered:

- TokenCard, used for IBM interoperability and Netware servers (128Kb RAM)
- TokenCard WS, used for Netware workstations (2.8Kb RAM)

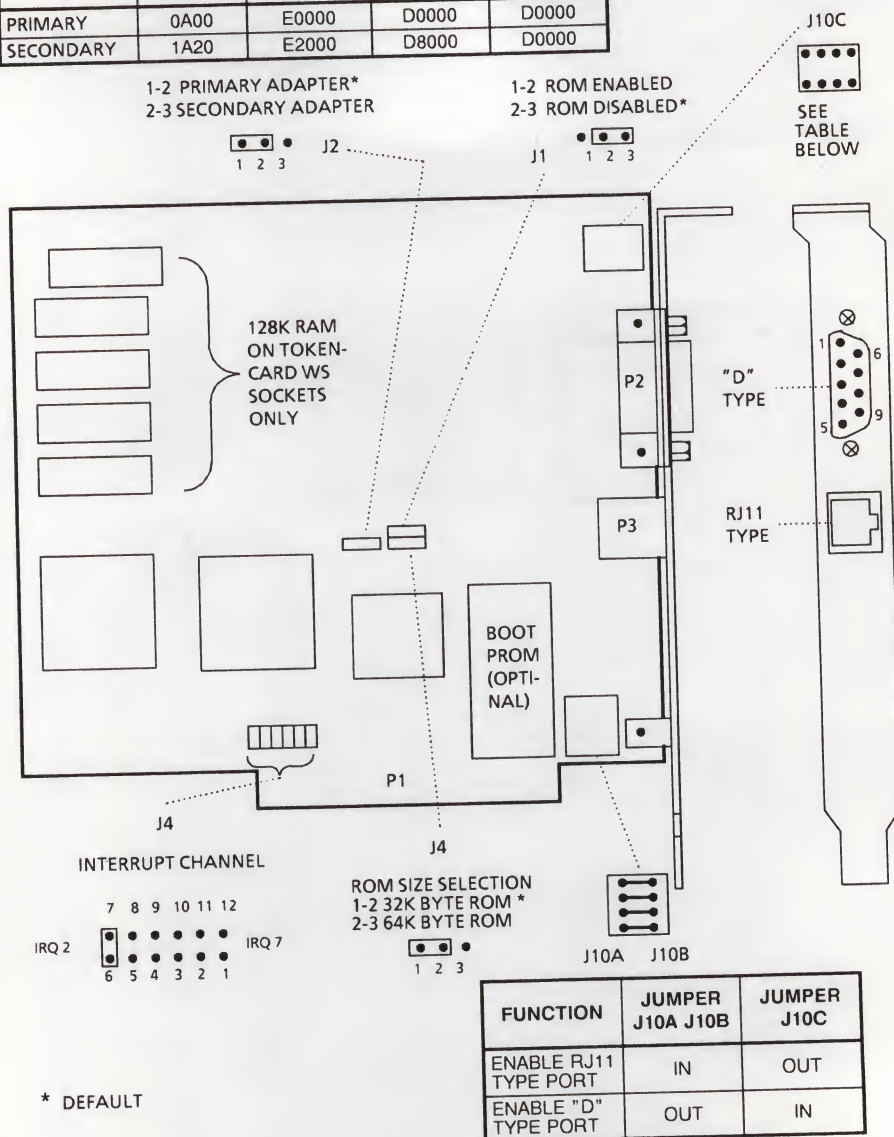
### 15.23.2. Connections TokenCard / TokenCard WS





### 15.23.3. Strap Settings / Adjustments TokenCard / TokenCard WS

FUNCTION	I/O BASE ADDRESS	SHARED RAM BASE ADDRESS	32K ROM BASE ADDRESS	64K ROM BASE ADDRESS
PRIMARY	0A00	E0000	D0000	D0000
SECONDARY	1A20	E2000	D8000	D0000



### 15.23.5. Installation / Maintenance TokenCard / TokenCard WS

Hardware installation.

When the jumper settings are verified and all configuration changes are made, the adapter may be installed in any expansion slot.

Software installation.

The adapter requires software to be installed before the computer can be inserted into the ring. The **TokenDisk** diskette provides software and instructions for TokenCard operations, including software drivers. Refer to the section appropriate for the network software package will be use with the adapter.

Each NetWare directory on the **TokenDisk** diskette contains an **install.doc** file that provides loading information specificto the operating system version.

For example , to install the driver software for NetWare version 2.1, read the **install.doc** file in the "NETWARE21" directory on the **TokenDisk** diskette.

### 15.23.6. Diagnostic Functions Tokencard / Tokencard WS

Connect the adapter to a MAU port and use the Diagnostic Program on the **TokenDisk** diskette to verify that the adapter and cable are correctly installed.

The program is located in the "DIAG" directory of the diskette. If the IRQ channel is changed from the factory setting, specify the new IRQ channel in the configuration menu displayed by the program.



## 15.24. NI6510 RACAL INTERLAN CONTROLLER

### 15.24.1. Characteristics Controller NI6510 RACAL InterLan

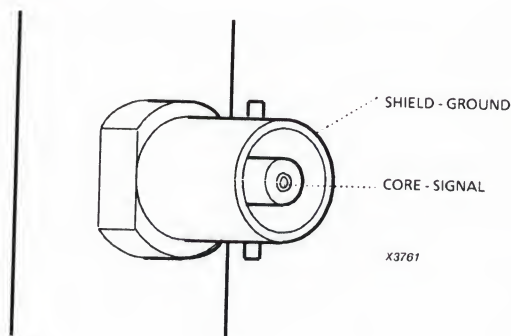
The NI6510 RACAL InterLan Controller is a data-link-level network expansion board, which allows communication with other devices over an Ethernet Local Area Network. The NI6510 RACAL InterLan Controller is fully compatible with standard Ethernet (IEEE 802.3 10BASE5) networks and Thin Ethernet (Cheapernet) (IEEE 802.3 10BASE2) networks.

### 15.24.2. Connections NI6510 LAN Controller

10BASE5 IEEE 802.3 Connector J2 (15-PIN Female)

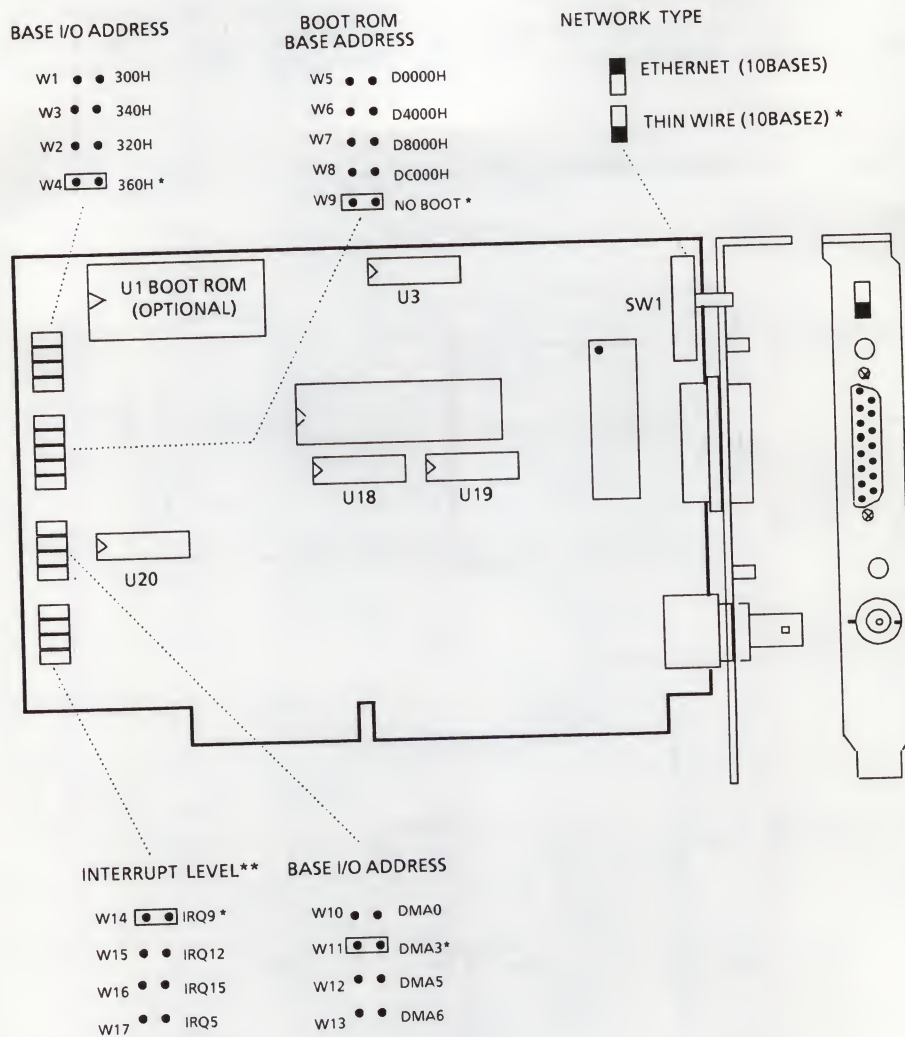
PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	Shield	9	Collision Precence -
2	Collision Precence +	10	Transmit -
3	Transmit +	11	Shield (Transmit)
4	Shield (Receive)	12	Receive -
5	Receive +	13	Power + 12V
6	Power return	14	Shield (Voltage)
7	Reserved	15	Reserved
8	Reserved		

10BASE2 IEEE 802.3 Connector J1





### 15.24.3. Strap Settings / Adjustments NI6510 InterLan Controller



\* PRESET CONFIGURATION

\*\* The value is not "Hex" as indicated on the board

### **15.24.5. Installation / Maintenance NI6510 InterLAN Controller**

The NI6510 InterLAN may be installed in any of the option board slots. Put the straps in the desired positions. Ensure that there is no conflict in board addresses or interrupts used with any other options installed.

#### **10BASE5 and 10BASE2 Networks**

The NI6510 InterLAN operates correctly only with Medium Attachment Units (MAUs) (AC-coupled transceivers) that are compatible with IEEE 802.3 and / or Ethernet V1.0 specifications in a 10BASE5 network. The NE1000A is connected with a BNC connector in a 10BASE2 network and is fully compatible with Thin Ethernet (Cheapernet) IEEE 802.3 10BASE2 networks. For full details of the 10BASE5 and 10BASE2 connections, refer to 15.12.5.

### **15.24.6. Diagnostic Function NI6510 InterLAN Controller**

After installation, use the NI6510 Diagnostic Program to test the board to make sure that it is installed properly, and that its network connection is functional.

Copy the following files from the diagnostic diskette to a directory in the DOS path:

- NI6510DG.HLP
- NI6510DG.EXE

At the DOS prompt enter NI6510DG and follow the instruction on the screen Run " All Tests". In case of an error refer to the NI6510 Installation Manual.

15.24-4

# PC-OPTIONS CE

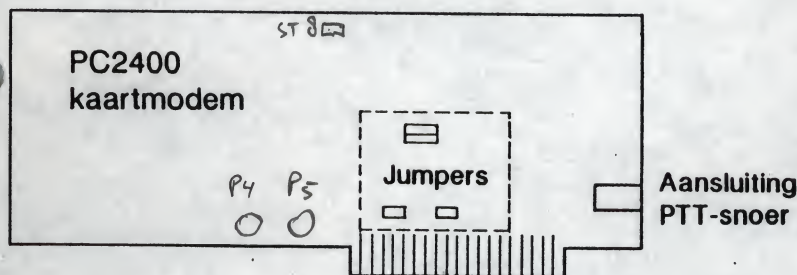
9105

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# PC2400 kaartmodem

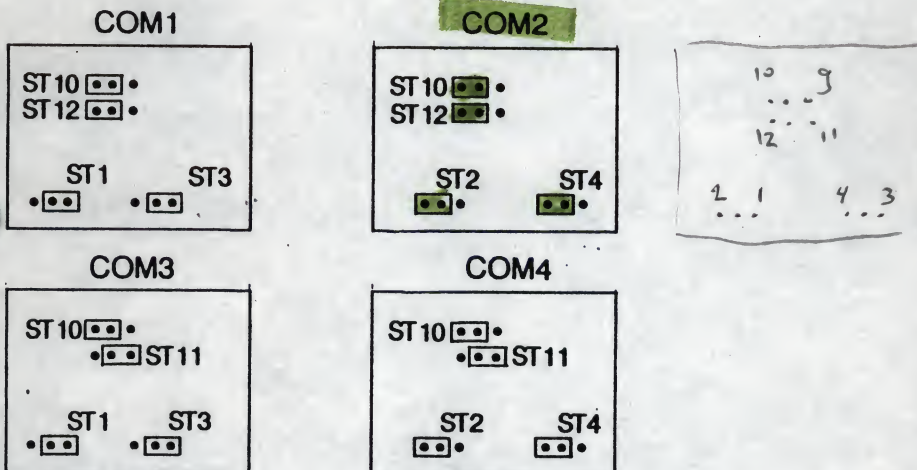
.... 7 21078

Nu moet u kiezen, of de communicatie-software de modem via COM 1, COM 2, COM 3 of COM 4 aanstuurt. Meestal is er al een seriële poort (COM 1) in gebruik voor bijvoorbeeld een seriële printer of een muis. Daarom zal de kaartmodem dan ingesteld moeten worden op de tweede seriële poort, COM 2. U moet er wel op letten, dat per seriële poort maar één interface wordt aangestuurd (zie hiervoor ook de technische beschrijving van uw computer). Met behulp van vier jumpers kan de juiste COM-poort gekozen worden (zie figuur 1).



**Figuur 1 : Positie jumpers.**

Instelling jumpers voor:

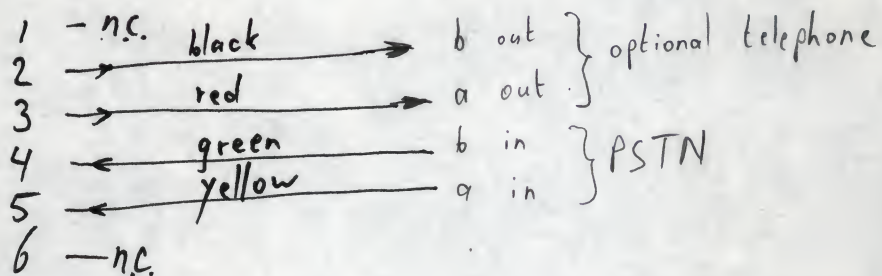
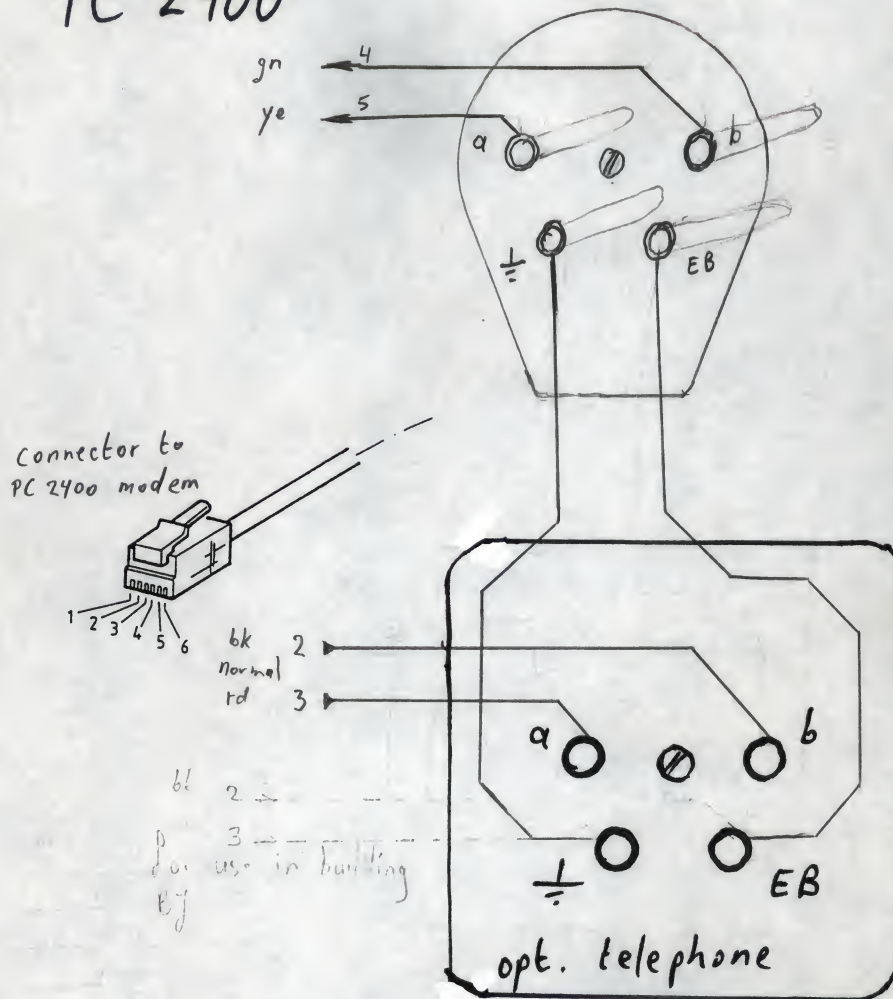


Bij P3230 COM2 in SETUP disabled

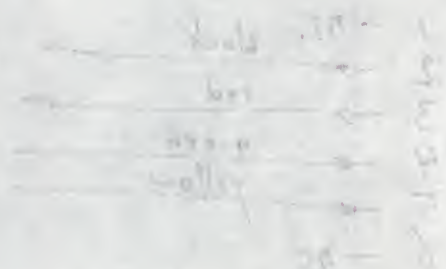




# PC 2400



PC 5400

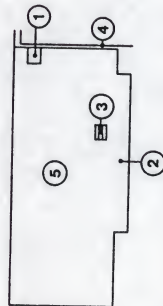




## IN GEBRUIK NEMEN VAN HET MODEM

Met de jumpers kunt u instellen via welke communicatiepoort deze seriële poort wordt geselecteerd.

- 1 Connector voor doorvoerstekker
- 2 PC-bus
- 3 Jumpers COM1, COM2, COM3 of COM4
- 4 Bevestigingsbeugel
- 5 Luidspreker



Afbeelding 3. PC2400 (kaartmodel).

### 3.3 WAT HEBT U NOG MEER NODIG?

Behalve de PC2400 hebt u nodig:

- een telefoonaansluiting
- een computer of terminal met een seriële poort (tafelmodel) of met een uitbreidingslot (kaartmodel)
- communicatieprogramma
- telefoonnummer en andere gegevens (snelheid, pariteit etc.) van de databank waarmee u contact wilt leggen.
- seriële kabel (tafelmodel)
- stopcontact (tafelmodel).

## IN GEBRUIK NEMEN VAN HET MODEM

### 3.4 INSTALLATIE PC2400 (TAFELMODEL)

1. Verbind de seriële poorten van modem en computer met elkaar.
2. Neem de kabel met doorvoerstekker en klik de telejack (aan de andere zijde van de kabel) in de connector van het modem (zie afbeelding 2). Steek de doorvoerstekker in het telefoon-stopcontact en de stekker van de telefoon in de doorvoerstekker.
3. Steek de netstekker van het modem in het stopcontact.
4. Zet het modem aan door de schakelaar aan de achterzijde in de bovenste stand te zetten. De groene power-LED brandt nu.
5. Na het inschakelen zal het modem een uitgebreide zelftest uitvoeren. Dit duurt een aantal seconden. Als de test goed is doorlopen, klinkt een korte toon en is het modem gereed voor gebruik.

### 3.5 INBOUW PC2400 (KAARTMODEL)

Het kaartmodel van de PC2400 wordt op een PC-uitbreidingslot (PC-bus) aangesloten. Omdat het kaartmodel al een eigen seriële poort heeft, hoeft u de seriële poort van de computer niet te gebruiken.

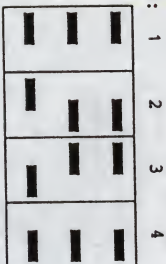
De seriële poort van het kaartmodel is standaard ingesteld op COM2 omdat op de meeste PC's COM1 al bezet is. Deze wordt immers vaak gebruikt om een muis aan te sluiten. COM3 en COM4 worden niet door alle communicatieprogramma's ondersteund. Zie afbeelding 5 voor de adressen van de COM-poorten.

Gebruik de jumpers op het kaartmodel (zie afbeelding 3) wanneer u de configuratie moet wijzigen. Het modem kan via COM1, COM2, COM3 of COM4 worden aangesproken.



## IN GEBRUIK NEMEN VAN HET MODEM

Zorg ervoor dat de COM-poort waarop het kaartmodem is ingesteld, niet door een andere kaart wordt gebruikt. Anders zal zowel het modem als de andere seriële toepassing niet goed functioneren.

COM:	1	2	3	4
				

Afbeelding 4. Jumperinstellingen.

COM	Adres	IRQ
COM1	\$03F8	IRQ4
COM2	\$02F8	IRQ3
COM3	\$03E8	IRQ4
COM4	\$02E8	IRQ3

Afbeelding 5. Adressen COM-poort op de PC.

Bouw het kaartmodem als volgt in.

1. Zet uw computer uit.
2. Open de kast van uw PC.
3. Verwijder een beugel van de achterwand (bewaart de schroef!).

## IN GEBRUIK NEMEN VAN HET MODEM

4. Plaats het kaartmodem in de lange uitbreidingsconnector van de PC. Zorg dat de modembeugel goed op de achterwand aansluit en druk de kaart stevig in de connector.

5. Zet de modembeugel met de schroef vast.

6. Sluit de kast van de PC.

7. Neem de kabel met doorvoerstekker en klik de telejack (aan de andere zijde van de kabel) in de connector van het modem (zie afbeelding 3). Steek de doorvoerstekker in het telefoon-stopcontact en de stekker van de telefoon in de doorvoerstekker.

### 3.6 TOT STAND BRENGEN VAN EEN DATA-VERBINDING

In deze paragraaf zullen we stapsgewijs de handelingen doorname die nodig zijn om een dataverbinding op te bouwen.

Het communicatieprogramma wordt alleen globaal besproken, aangezien elk pakket zijn eigen commandostructuur heeft.

1. Start het communicatieprogramma.
2. Zorg dat de software de seriële poort aanstuurt waarop het modem is aangesloten.
3. Selecteer de communicatiesnelheid (baudrate), het aantal databits en de pariteit. Bijvoorbeeld: 2400 bps, 8 bits, geen pariteit.
4. Zorg dat de software in de terminal-mode staat, zodat ingetoerste tekens naar het modem worden gestuurd. Het modem echoot op zijn beurt de tekens naar het scherm.

## 16. VIDEO CONTROL UNITS

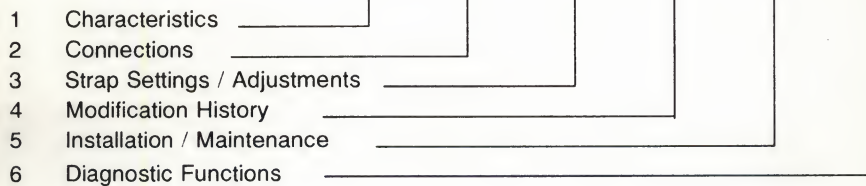
Section:

Page:

1 : Technical Overview	16.1-1
1.1: Option Cross Reference Guide	16.1-1
1.2: Technical Data	16.1-2

2: Persyst Colour Board	16.2-1	16.2-2	16.2-3	16.2-5	16.2-6	n.a.
3: Everex Monochr. Board	16.3-1	16.3-2	16.3-3	16.3-4	16.3-4	n.a.
4: Standard Video Board	16.4-1	16.4-2	16.4-3	16.4-6	16.4-6	n.a.
5: AST-3G Plus	16.5-1	16.5-1	16.5-3	n.a.	16.5-6	n.a.
6: AST Preview	16.6-1	16.6-2	16.6-3	n.a.	16.6-4	n.a.
7: ATI Graphics Solution	16.7-1	16.7-1	16.7-2	16.7-4	16.7-4	n.a.
8: ATI EGA Wonder	16.8-1	16.8-1	16.8-3	n.a.	16.8-5	n.a.
9: Paradise OEM 6 EGA	16.9-1	16.9-1	16.9-2	16.9-4	16.9-4	n.a.
10: ATI Small Wonder Graphics Solution	16.10-1	16.10-1	16.10-3	16.10-4	16.10-4	n.a.
11: Paradise OEM8 VGA	16.11-1	16.11-1	16.11-3	n.a.	16.11-4	n.a.
12: Philips 8/16 VGA	16.12-1	16.12-1	16.12-3	16.12-5	16.12-5	n.a.
13: Cardinal VGA700	16.13-1	n.a.	16.13-3	n.a.	16.13-4	n.a.

Subsection:



**NOTE:** n.a. means that this section is not available for this unit.



## 16.1. TECHNICAL OVERVIEW

### 16.1.1. Option Cross Reference Guide

OPTION	P 2 1 2 0	P 2 2 3 0	A V E N G	P31xx				P32xx				P33xx								P 3 4 6 4	P 3 4 0 0	P91xx								
				0	0	0	0	2	0	0	0	0	3	3	0	0	4	4	5			6	6	7	0	3	3	6	6	7
				1	2	1	1	0	0	0	2	4	0	8	1	2	5	8	0			0	1	0		0	5	0	5	0
2: Persyst Colour Board				x	x	x	x		x	x	x	x																		
3: Everex Monochr. Board						x			x	x	x	x																		
4: Standard Video Board									x	x	x	x																		
5: AST-3G Plus				x	x	x	x		x	x	x	x										x								
6: AST Preview									x	x	x	x																		
7: ATI Graphics Solution				x	x	x	x	x	x	x	x	x	x	x	x															
8: ATI EGA Wonder					x	x	x		x	x	x	x		x	x															
9: Paradise OEM 6 EGA					x	x	x	x	x	x	x	x	x	x		x						x	x		x					
10: ATI Small Wonder Graphics Solution					x	x	x																							
11: Paradise OEM8 VGA												x		x				x					x		x					
12: Philips 8/16 VGA							x					x			x			x	x		x						x			



## 16.1.2. Technical Data

### PERSYST COLOUR BOARD

GENERAL DATA	
Output	IRGB
Display Memory	16 KByte (DMA Possible)
Power requirements	5V, 0.5A

ALPHANUMERIC MODES							
Mode Name	Res.	Colours	A/N Format	Buffer Start Address	Box Size	Hor. Freq.	Vert. Freq.
CGA	320x200	16	40x25	B8000	8x8	15.7KHz	60Hz
CGA	640x200	16	80x25	B8000	8x8	15.7KHz	60Hz

GRAPHIC MODES							
Mode Name	Res.	Colours	A/N Format	Buffer Start Address	Box Size	Hor. Freq.	Vert. Freq.
CGA	320x200	4	40x25	B8000	8x8	15.7KHz	60Hz
CGA	640x200	2	80x25	B8000	8x8	15.7KHz	60Hz

# STANDARD VIDEO BOARD

	GENERAL DATA
Output	TTL/Int. RGB, Mono or Colour, Composite Video
Display Memory	16 KByte (DMA possible)
Power requirements	5V, 6A

ALPHANUMERIC MODES							
Mode Name	Res.	Colours	A/N Format	Buffer Start Address	Box Size	Hor. Freq.	Vert. Freq.
CGA	320x200	16	40x25	B8000	8x8	15.7KHz	60Hz
CGA	640x200	16	80x25	B8000	8x8	15.7KHz	60Hz
MDA	720x350	Mono	80x25	B0000	9x14	18.4KHz	50Hz

GRAPHIC MODES							
Mode Name	Res.	Colours	A/N Format	Buffer Start Address	Box Size	Hor. Freq.	Vert. Freq.
CGA	320x200	4	40x25	B8000	8x8	15.7KHz	60Hz
CGA	640x200	2	80x25	B8000	8x8	15.7KHz	60Hz

# AST-3G Plus

	GENERAL DATA
Output	TTL/Int. RGB/r'g'b', Mono or Colour
Display Memory	256 KByte (DMA Possible)

ALPHANUMERIC MODES							
Mode Name	Res.	Colours	A/N Format	Buffer Start Address	Box Size	Hor. Freq.	Vert. Freq.
CGA	320x200	16	40x25	B8000	8x8	15.7KHz	60Hz
CGA	640x200	16	80x25	B8000	8x8	15.7KHz	60Hz
CGA	640x350	16	80x25	B8000	8x14	15.7KHz	60Hz
EGA	640x350	16/64	80x25	B8000	8x14	21.8KHz	60Hz
EGA	640x344	16/64	80x43	B8000	8x8	21.8KHz	60Hz
MDA	720x350	Mono	80x25	B0000	9x14	18.4KHz	50Hz
MDA	720x344	Mono	80x43	B0000	9x8	18.4KHz	50Hz

GRAPHIC MODES							
Mode Name	Res.	Colours	A/N Format	Buffer Start Address	Box Size	Hor. Freq.	Vert. Freq.
CGA	320x200	4	40x25	B8000	8x8	15.7KHz	60Hz
CGA	640x200	2	80x25	B8000	8x8	15.7KHz	60Hz
EGA	320x200	16	40x25	A0000	8x8	15.7KHz	60Hz
EGA	640x200	16	80x25	A0000	8x8	15.7KHz	60Hz
EGA	640x350	Mono	80x25	A0000	8x14	21.8KHz	60Hz
EGA	640x350	16/64	80x25	A0000	8x14	21.8KHz	60Hz
HGC	720x348	Mono	80x25	B0000	9x14	18.4KHz	50Hz

**EVEREX MONOCHR. BOARD / AST-PREVIEW**

	GENERAL DATA
Output	TTL/Int. Monochrome
Display Memory	64 Kbyte or 32 Kbyte (soft-selectable)

ALPHANUMERIC MODES							
Mode Name	Res.	Colours	A/N Format	Buffer Start Address	Box Size	Hor. Freq.	Vert. Freq.
MDA		Mono	40x25	B0000	9x14	18.4KHz	50Hz
MDA		Mono	80x25	B0000	9x14	18.4KHz	50Hz

GRAPHIC MODES							
Mode Name	Res.	Colours	A/N Format	Buffer Start Address	Box Size	Hor. Freq.	Vert. Freq.
HGC	720x348	Mono	80x25	B0000	9x14	18.4KHz	50Hz



# ATI (SMALL WONDER) GRAPHICS SOLUTION

	GENERAL DATA
Output	TTL/Int. IRGB, Mono or Colour, Composite
Display Memory	64 KByte
Power requirements	5V, 0.95A Max.

ALPHANUMERIC MODES							
Mode Name	Res.	Colours	A/N Format	Buffer Start Address	Box Size	Hor. Freq.	Vert. Freq.
CGA	320x200	16	40x25	B8000	8x8	15.7kHz	60Hz
CGA	640x200	16	80x25	B8000	8x8	15.7kHz	60Hz
MDA	720x350	Mono	80x25	B0000	9x14	18.2kHz	49.4Hz
132 Col	1056x350	Mono	132x25	B0000	8x14		
132 Col	1056x352	Mono	132x44	B0000	8x14		
132 Col	1056x200	16	132x25	B8000	8x8		

GRAPHIC MODES							
Mode Name	Res.	Colours	A/N Format	Buffer Start Address	Box Size	Hor. Freq.	Vert. Freq.
CGA	320x200	4	80x25	B8000	8x8	15.7kHz	60Hz
CGA	640x200	2	80x25	B8000	8x8	15.7kHz	60Hz
HGC	720x348	Mono	80x25	B0000	9x14	18.8kHz	50.9Hz
Plantronics	320x200	16	40x25	B8000	8x8	15.7kHz	60Hz
Plantronics	640x200	4	80x25	B8000	8x8	15.7kHz	60Hz
ATI Hi Res	640x200	16	80x25	B0000			

# ATI EGA WONDER

	GENERAL DATA
Output	TTL/Int. RGB/r'g'b', Mono or Colour
Display Memory	256 KByte (DMA Possible)
Power Requirements	5V, 0.7A

ALPHANUMERIC MODES							
Mode Name	Res.	Colours	A/N Format	Buffer Start Address	Box Size	Hor. Freq.	Vert. Freq.
CGA	320x200	16	40x25	B8000	8x8	15.7KHz	60Hz
CGA	640x200	16	80x25	B8000	8x8	15.7KHz	60Hz
EGA	320x350	16/64	40x25	B8000	8x14	21.8KHz	60Hz
EGA	640x350	16/64	80x25	B8000	8x14	21.8KHz	60Hz
MDA	720x350	Mono	80x25	B0000	9x14	18.2KHz	49.4Hz
132 Col	1056x200	16	132x25	B8000	8x8		
132 Col	1056x200	mono	132x25	B0000	8x8		
132 Col	1056x352	16	132x44	B8000	8x8		
132 Col	1056x352	mono	132x44	B0000	8x8		
	640x462	16	80x33	B8000			

GRAPHIC MODES							
Mode Name	Res.	Colours	A/N Format	Buffer Start Address	Box Size	Hor. Freq.	Vert. Freq.
CGA	320x200	4	40x25	B8000	8x8	15.7KHz	60Hz
CGA	640x200	2	80x25	B8000	8x8	15.7KHz	60Hz
EGA	320x200	16	40x25	A0000	8x8	15.7KHz	60Hz
EGA	640x200	16	80x25	A0000	8x8	15.7KHz	60Hz
EGA	640x350	Mono	80x25	A0000	8x14	21.8KHz	60Hz
EGA	320x350	16/64	80x25	A0000	8x14	21.8KHz	60Hz
VGA	640x480	2/64	80x30	A0000	8x16		
VGA	640x480	16/64	80x30	A0000	8x16		
HGC	720x348	Mono	80x25	B0000	9x14	18.8KHz	50.9Hz
Multisync	640x480	16/64	80x34	A0000			
Multisync	752x410	16/64	94x29	A0000			
Multisync	800x560	16/64	100x42	A0000			
Multisync	800x600	16/64	100x42	A0000			

# PARADISE OEM 6 EGA

	GENERAL DATA
Output	TTL/Int. RGB,r'g'b', Mono or Colour
Display Memory	256 KByte
Power requirements	5V, 0.75A

ALPHANUMERIC MODES							
Mode Name	Res.	Colours	A/N Format	Buffer Start Address	Box Size	Hor. Freq.	Vert. Freq.
CGA	320x200	16	40x25	B8000	8x8	15.7KHz	60Hz
CGA	640x200	16	80x25	B8000	8x8	15.7KHz	60Hz
EGA	320x350	16/64	40x25	B8000	8x14	21.8KHz	60Hz
EGA	640x350	16/64	80x25	B8000	8x14	21.8KHz	60Hz
MDA	720x350	Mono	80x25	B0000	9x14	18.2KHz	49.4Hz
Ext.	640x480	16/64	80x30	B8000	8x16	30.5KHz	60Hz
132 Col	1056x344	16/64	132x25	B8000	8x14		
132 Col	1056x350	16/64	132x43	B8000	8x8		

GRAPHIC MODES							
Mode Name	Res.	Colours	A/N Format	Buffer Start Address	Box Size	Hor. Freq.	Vert. Freq.
CGA	320x200	4	40x25	B8000	8x8	15.7KHz	60Hz
CGA	640x200	2	80x25	B8000	8x8	15.7KHz	60Hz
EGA	320x200	16	40x25	A0000	8x8	15.7KHz	60Hz
EGA	640x200	16	80x25	A0000	8x8	15.7KHz	60Hz
EGA	640x350	Mono	80x25	A0000	8x14	21.8KHz	60Hz
EGA	320x350	16/64	80x25	A0000	8x14	21.8KHz	60Hz
HGC	720x348	Mono	80x25	B0000	9x14	18.8KHz	50.9Hz
Plantronics	320x200	16	40x25	B8000	8x8	15.7KHz	60Hz
Plantronics	640x200	4	80x25	B8000	8x8	15.7KHz	60Hz
Multisync	640x480	16/64	80x25	B0000	8x8	30.5KHz	60Hz



# PARADISE OEM 8 VGA

GENERAL DATA	
Output	Analog (RGB / Monochrome)
Hor Scan Freq.	27.6/28.0/31.5/35.2 kHz
Refresh Rate Hz	56.2/60/62.3/70 Hz
Display Memory	256 KByte , 120nsec RAM

ALPHANUMERIC MODES							
Mode Name	Res.	Colours	A/N Format	Buffer Start Address	Box Size	Max. Pgs.	Vert. Freq. (1)
CGA	320x200	16/256K	40x25	B8000	8x8	8	70Hz
EGA	320x350	16/64	40x25	B8000	8x14	8	70Hz
MCGA	320x400	16/256K	40x25	B8000	8x16	8	70Hz
VGA	360x400	16/256K	40x25	B8000	9x16	8	70Hz
CGA	640x200	16/256K	80x25	B8000	8x8	8	70Hz
EGA	640x350	16/64	80x25	B8000	8x14	8	70Hz
MCGA	640x400	16/256K	80x25	B8000	8x16	8	70Hz
VGA	720x400	16/256K	80x25	B8000	9x16	8	70Hz
MDA	720x350	Mono	80x25	B0000	9x14	8	70Hz
EGA	720x350	Mono	80x25	B0000	9x14	8	70Hz
VGA	720x400	Mono	80x25	B0000	9x16	8	70Hz
132 Col (2)	924x387	16/256K	132x43	B8000	7x9	1	70Hz
132 Col (3)	1056x387	16/256K	132x43	B8000	8x9	1	70Hz
132 Col (2)	924x400	16/256K	132x25	B8000	7x16	1	70Hz
132 Col (3)	1056x400	16/256K	132x25	B8000	8x16	1	70Hz
132 Col (2)	924x387	Mono	132x43	B8000	7x8	1	70Hz
132 Col (3)	1056x387	Mono	132x43	B8000	8x9	1	70Hz
132 Col (2)	924x400	Mono	132x25	B8000	7x16	1	70Hz
132 Col (3)	1056x400	Mono	132x25	B8000	8x16	1	70Hz

- Notes:** (1) Value given is for fixed frequency monitors only, multi-frequency monitors use different frequencies (refer to 16.11.3.)  
(2) Special modes for the OEM 8 VGA controller  
(3) These modes are for multi-frequency monitors only

VGA.CFG

```

PARADISE VGA (1) ; board name
PARADISE ; chip set
4 ; bank s
6 ; menu text color
1 1 0x13 000 320 200 256 ; VGA modes
1 1 0x5E 000 640 400 256 ; EGA modes
0 0 0x10 000 640 350 16 ; EGA modes
0 1 0x12 000 640 480 16
0 1 0x58 000 800 600 16
VGA mode resolution

```

8904

PC-OPTIONS CE

16.1-9



7  
 6  
 3  
 4  
 5  
 6  
 7  
 8  
 9  
 A  
 B  
 C  
 D  
 E  
 F  
 10  
 12  
 13  
 58

GRAPHIC MODES							
Mode Name	Res.	Colours	A/N Format	Buffer Start Address	Box Size	Max. Pgs.	Vert. Freq. (1)
CGA	320x200	4/256K	40x25	B8000	8x8	1	70Hz
EGA	320x200	4/64	40x25	B8000	8x8	1	70Hz
VGA	320x200	4/256K	40x25	B8000	8x8	1	70Hz
CGA	640x200	2/256K	80x25	B8000	8x8	1	70Hz
EGA	640x200	2/64	80x25	B8000	8x8	1	70Hz
VGA	640x200	2/256K	80x25	B8000	8x8	1	70Hz
EGA	320x200	16/64	40x25	A0000	8x8	8	70Hz
VGA	320x200	16/256K	40x25	A0000	8x8	8	70Hz
EGA	640x200	16/64	80x25	A0000	8x8	4	70Hz
VGA	640x200	16/256K	80x25	A0000	8x8	4	70Hz
EGA	640x350	Mono	80x25	A0000	8x14	2	70Hz
VGA	640x350	Mono	80x25	A0000	8x14	2	70Hz
EGA	640x350	16/64	80x25	A0000	8x14	2	70Hz
VGA	640x350	16/256K	80x25	A0000	8x14	2	70Hz
VGA	640x480	2/256K	80x30	A0000	8x16	1	60Hz
VGA	640x480	16/256K	80x30	A0000	8x16	1	60Hz
VGA	320x200	256/256K	40x25	A0000	8x8	1	70Hz
800 col (2)	800x600	16/256K	100x75	A0000	8x8	1	56Hz
800 col (2)	800x600	Mono	100x75	A0000	8x8	1	56Hz
HGC	720x348	Mono	80x25	B0000	9x14	1	70Hz

- Notes:** (1) Value given is for fixed frequency monitors only, multi-frequency monitors use different frequencies (refer to 16.11.3.)  
 (2) Special modes for the OEM 8 VGA controller using a multi-frequency monitor

# PHILIPS 8/16 VGA

GENERAL DATA	
Output	Analog (RGB / Monochrome) Digital (TTL RGB / Monochrome)
Hor Scan Freq.	15.7/18.4/21.8/31.5 kHz
Refresh Rate Hz	50/60/70 Hz
Display Memory	82C451 VGA chip : 128 Kbytes RAM only; 82C452 VGA chip : 128 or 512 Kbytes RAM.

SUPPORTED VIDEO MODES							
MODE NAME	RES.	COLOURS	A/N FORMAT	BUFFER START ADRES	BOX SIZE	HOR. FREQ. (kHz)	VER. FREQ.
MDA	720x350	Mono	80x25	B0000	9x14	31.5	70
HGC	720x348	Mono	80x25	B0000	9x14	18.4	50
CGA	320x200	4	40x25	B8000	8x8	15.7	60
CGA	640x200	2	80x25	B8000	8x8	15.7	60
Plantronics	640x200	16	80x25	B8000	8x8	15.7	60
EGA	640x350	16/64	80x25	B8000	8x8	15.7	60
VGA	320x200	256/256K	80x25	A0000	9x16	31.5	70
VGA	640x480	16/256K	80x25	A0000	9x16	31.5	60
VGA	800x600	16/256K	80x25	A0000	9x16	31.5	70
132 Col	1056x350	4	132x25	B0000	8x14	18.4	50
132 Col	1056x350	4	132x43	B0000	8x8	18.4	50
132 Col	1056x400	16/256K	132x25	B8000	8x16	31.5	70
132 Col	1056x400	16/256K	132x50	B8000	8x8	31.5	70

When combinations of video boards are used, only one video mode (Colour or Monochrome) can be active at a time. Switching between video modes can be done by the MODE command (see MS-DOS reference manual). The video mode in effect after booting up (Colour or Monochrome) is determined by the values in the CMOS RAM (see section 2.3., Installation) and switches on the system board (see chapter 9, Processors). Configuration examples are given in the sub-sections "strap settings/adjustments" of the Video Controller Boards.

Terms and abbreviations used:

MD : TTL Monochrome display monitor  
CD : Color Display Monitor (TTL IRGB)  
ECD : Enhanced Colour Display Monitor (TTL RGB/rgb, or TTL IRGB)  
MCGA : This is a video mode provided on IBM PS/2 models 25 and 30  
MDA : Monochrome Display Adapter  
CGA : Colour Graphics Adapter  
EGA : Enhanced Graphics Adapter  
HGC : Hercules Graphics Card  
VGA : Video Graphics Array

## 16.2. PERSYST COLOUR BOARD

### 16.2.1. Characteristics Persyst Colour Board

The Persyst Colour Board has all the necessary hardware required to connect an IBM compatible colour monitor to the PC. It is completely software compatible with the IBM Colour Graphics Adapter.

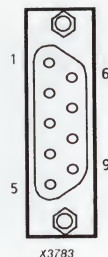
CGA



## 16.2.2. Connections Persyst Colour Board

### IRGB Video Connector J1

PIN	SIGNAL NAME
1	GROUND
2	GROUND
3	RED
4	GREEN
5	BLUE
6	INTENSITY
7	RESERVED
8	HORIZONTAL SYNC
9	VERTICAL SYNC



### Light Pen Connector J3

PIN	SIGNAL NAME
1	LPEN IN-N
2	N.C.
3	LPEN SW-N
4	GROUND
5	+ 5 VDC
6	+ 12 VDC

### R.F. Modulator Connector J4

PIN	SIGNAL NAME
1	+ 12 VDC
2	N.C.
3	COMPOSITE OUT
4	GROUND

### Composite Video Connector J5

PIN	SIGNAL NAME
1	COMPOSITE OUT
2	GROUND

### 16.2.3. Strap Settings / Adjustments Persyst Colour Board

The default setting (the mode which the system comes into when switched on) is determined by switch settings on the main board.

#### P3102:

P3102 104XX/124XX 4/2-Layer Board Adjustment

VIDEO MODE	SW3-3	SW3-4
HIGH RESOLUTION (80 CHAR. x 25 LINES)	ON	OFF
LOW RESOLUTION (40 CHAR. x 25 LINES)	OFF	ON

**NOTE:** The 200/400 switch on the rear of the system must be in the "200" position!

#### P320X:

Use the default settings also if this board is used in combination with other video boards.

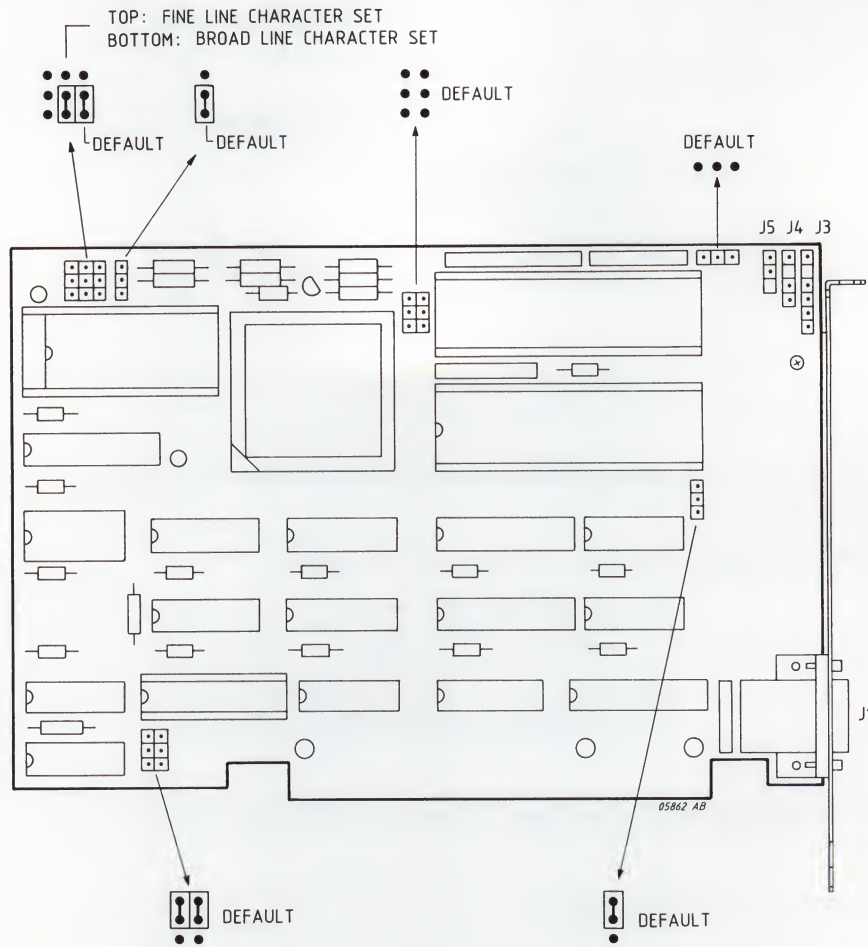
P320X main board adjustment. (Setup to CO80, or CO40)

VIDEO MODE	SW1-1 Colour	SW1-3 Persyst Slow Video
Colour	ON/Closed	OFF/Open

If the Setup information is not CO80 or CO40 the next message will appear on the screen:

"System Option Error RUN SETUP"

# Strap Locations Persyst Colour Board



Default Setting Shown

#### 16.2.4. Modification History Persyst Colour Board

VERSION	MODIFICATIONS
A	-----
B	CONSTANT SELECTION OF Z1 OR BY CHARCLK SIGNAL (STRAPS E25/26/27) & ADDITION OF STRAPS E28/29/30 FOR SELECTING IRQ5 OR IRQ7
C	
D	
E	EXTRA DELAY TIME FOR CADSEL-N AND RAS-N OF 25 nS



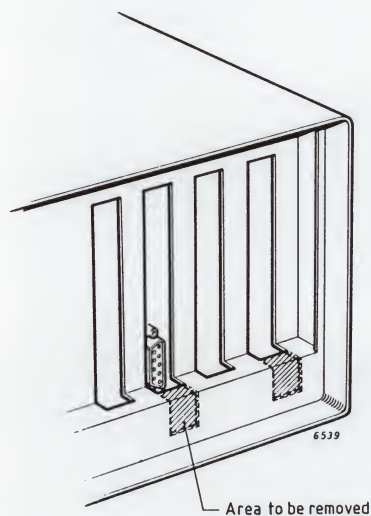
### 16.2.5. Installation / Maintenance Persyst Colour Board

The colour board may be installed in any of the option board slots on the main board of the system unit.

**WARNING:** *It is important that only an IBM compatible COLOUR monitor is connected to the board, as connecting a monochrome or non-compatible monitor may cause permanent damage to the monitor.*

#### P3101:

In some cases you will find that the slots on the rear of the machine are not of the sufficient depth to allow the monitor connected to be inserted. A pre-installation modification is then required. The two slots illustrated must therefore be lengthened by 1.0 cm using a suitable tool.



## **16.3. EVEREX MONOCHROME BOARD**

### **16.3.1. Characteristics Everex Monochrome Board**

This Monochrome Graphics adapter is fully compatible with the Hercules display card. A display memory of 64K is available, which can be configured as 32K bytes in order to be not in conflict with the IBM (or compatible) Colour/Graphics Adaptor. The used display memory size is software selectable. The necessary programs are delivered with the Everex Board. A lightpen interface and a parallel printer interface are available too.

## 16.3.2. Connections Everex Monochrome Board

### Video Connector J4

PIN	SIGNAL NAME
1	GROUND
2	GROUND
3	N.C.
4	N.C.
5	N.C.
6	INTENSITY
7	VIDEO
8	HORIZONTAL SYNC
9	VERTICAL SYNC-N



### Light Pen Connector J3

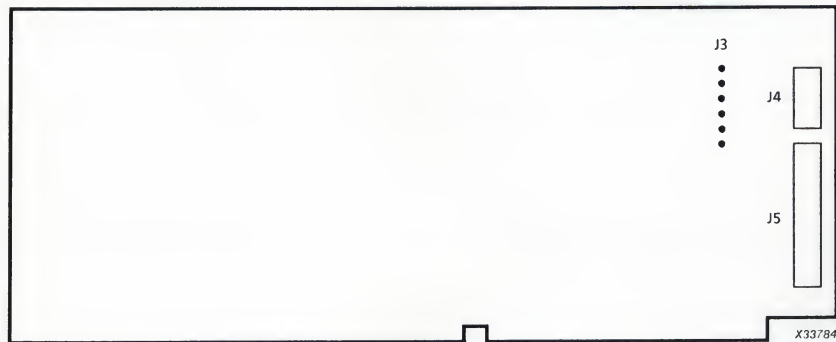
PIN	SIGNAL NAME
1	LPEN IN-N
2	N.C.
3	LPEN SW-N
4	GROUND
5	+5 VDC
6	+12 VDC

### Parallel Interface Connector J5

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	STROBE-N	14	AUTO FEED-N
2	DATA0	15	ERROR-N
3	DATA1	16	INIT-N
4	DATA2	17	SELECT IN-N
5	DATA3	18	GROUND
6	DATA4	19	GROUND
7	DATA5	20	GROUND
8	DATA6	21	GROUND
9	DATA7	22	GROUND
10	ACK-N	23	GROUND
11	BUSY	24	GROUND
12	PAPER END	25	GROUND
13	SELECT		

### 16.3.3. Strap Settings / Adjustments Everex Monochrome Board.

#### Connector Locations Everex Monochrome Board



For P320X Systems:

1. Strap SW1-1 on the Main PCB of the P320X Systems must be set for Monochrome Video. SW1-1 is OFF/OPEN.
2. In the SETUP program the "Primary Video Display" must be set to Monochrome.

If the Setup information is not monochrome the next message will appear on the screen:

"System Option Error RUN SETUP"



#### 16.3.4. Modification History Everex Monochrome Board

SI-NR	SUBJECT
P3100-035	Installation hercules compatible board on P3102.
P3100-038 P3200-003	Everex video board with MS-windows. Sometimes hang-up if returning from MS-Windows to MS-DOS. (Hardware Modification)

#### 16.3.5. Installation / Maintenance Everex Monochrome Board

The Everex Monochrome Board fits only in a PC Slot.

##### **WARNING:**

It is important that only an IBM compatible monochrome monitor is connected to the board, as connecting a colour or non-compatible monitor may cause permanent damage to the monitor.

If also an IBM Compatible colour board is present in the system the memory size of this board should be set to 32K. For doing this a program is available on the Everex distribution diskette.

Setting the Screen Memory Size:

- 1) Insert The Everex distribution diskette in the default drive.
- 2) Type: 64K <Return> or 32K <Return> to set the Screen memory to 64 or 32K respectively.

## 16.4. STANDARD VIDEO BOARD

MAD

### 16.4.1. Standard Video Board

The Standard Video controller supports either monochrome alphanumerics or colour alphanumerics and graphics. Either of these modes can be selected by On-Board jumpers or by program. A composite video (Female Phono Jack) and a direct drive (9 Pin D-shell) output are available, both accept Colour or Monochrome Monitors. It is fully software compatible with the IBM colour graphics and monochrome adaptors, and may be placed on an PC/XT slot (8 bits I/O Transfer) or an AT slot (8 or 16 bits I/O Transfer).

## 16.4.2. Connections Standard Video Board

### Video Connector J1

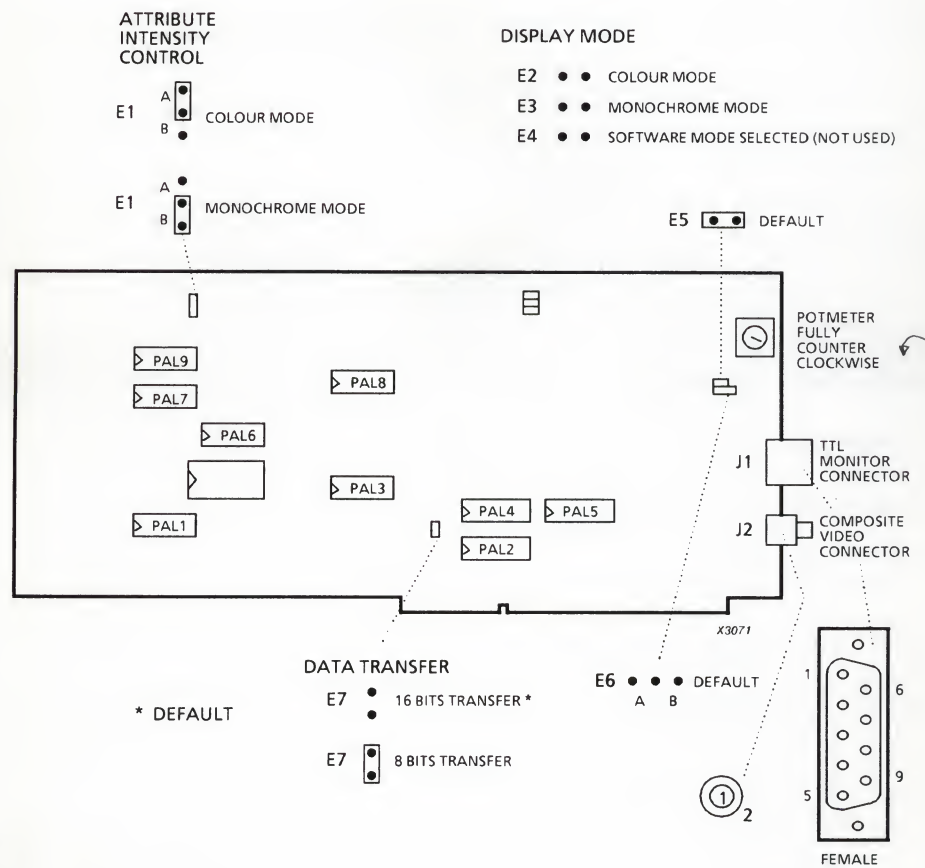
PIN	SIGNAL NAME
1	GROUND
2	SYNC / CRTCTL
3	RED
4	GREEN
5	BLUE
6	INTENSITY
7	VIDEO (MONO)
8	HORIZONTAL SYNC
9	VERTICAL SYNC (-N For monochrome)

### Composite Video Connector J2

PIN	SIGNAL NAME
1	COMPOSITE OUT
2	GROUND

### 16.4.3. Strap Settings / Adjustments Standard Video Board

#### Strap Locations Standard Video Board





(Strap E7) Eight and 16-bit video boards cannot be mixed (e.g., if an IBM PC Colour/graphics adapter or equivalent is installed in junction with a standard video controller, strap E7 must be installed because the other display boards interfaces with an 8-bit bus only).

**P3200:**

An overview of Setup information together with system board strapsetting will be given.

**STANDARD VIDEO BOARD ONLY IN SYSTEM**

**Default Strapsetting**

SW1-1 SYSTEM BOARD	SETUP SETTING	MONITOR TYPE CONNECTED TO STANDARD VIDEO BOARD
ON (CO)	CO80	COLOUR
ON (CO)	CO40	COLOUR
OFF (MO)	MONO	MONOCHROME

If the Setup information is not correct, the next message will appear on the screen:-

"System Option Error RUN SETUP"

**STANDARD VIDEO BOARD AND PERSYST BOARD**

**Stap Setting Standard Video Board:-**

Stap E7: Present (8 bits I/O)

Stap E3: Present (Monochrome only)

**Stap Setting Persyst Board default.**

SW1-1 SYSTEM BOARD	SETUP SETTING	MONITOR TYPE CONNECTED TO STANDARD VIDEO BOARD	MONITOR TYPE CONNECTED TO PERSYST BOARD
ON (CO)	CO80	MONOCHROME 1)	COLOUR
ON (CO)	CO40	MONOCHROME 1)	COLOUR
OFF (MO)	MONO	MONOCHROME	COLOUR 1)

**NOTE 1:** *Non active display (Secondary display)*

*Stops after the messages: SYSTEM MEMORY SIZE XXXX KB  
FIRST HARD DISK READY*

To change the active display to this monitor use the MODE Command (see MS-DOS manual). If the setup information is not as stated above in CMOS RAM the message "System Option Error RUN SETUP" appears on the primary display (determined by SW1-1).

#### STANDARD VIDEO BOARD AND EVEREX BOARD

Stap Setting Standard Video Board:-

Stap E7: Present (8 bits I/O)

Stap E3: Present (Colour only)

SW1-1 SYSTEM BOARD	SETUP SETTING	MONITOR TYPE CONNECTED TO STANDARD VIDEO BOARD	MONITOR TYPE CONNECTED TO EVEREX BOARD
ON (CO)	CO80	MONOCHROME 1)	COLOUR
ON (CO)	CO40	MONOCHROME 1)	COLOUR
OFF (MO)	MONO	MONOCHROME	COLOUR 1)

**NOTE 1:** *Non active display*

*Stops after the messages: SYSTEM MEMORY SIZE XXXX KB  
FIRST HARD DISK READY*

To change the active display to this monitor use the MODE Command (see MS-DOS manual). If the setup information is not as stated above in CMOS RAM the message "System Option Error RUN SETUP" appears on the default screen (determined by SW1-1).

#### 16.4.4. Installation / Maintenance Standard Video Board

SI-NR	SUBJECT
P3200-002	Graphic problem on video board. Combination of Supercalc and MS-Windows cause a problem in Graphic mode (Hardware modification).

		LOC.	REV. A
ROM 1	Character Generator	7B	U-27B
PALS			
1	TIMING	3G	102014
2	BUFFER	9G	102045
3	MONO ATTRI.	6F	102018
4	MEMORY	9F	102046
5	IO	10F	102041
6	MONOVIDEO	4D	102013
7	COLOURENB	3C	102016
8	ADDRE	6C	102012
9	COLOURSEL	3B	102015

#### 16.4.5. Installation / Maintenance Standard Video Board

The board may be installed in any of the option slots on the system board. If the board is placed in a PC-XT compatible option slot, strap E7 must be inserted.

##### **WARNING:**

It is important that the Board Setup (Monochrome or Colour) is correct for the connected monitor. Also the Main Board configuration must be correct, otherwise the POD (power on diagnostic) will detect an configuration error. To achieve the correct system Setup, run the SETUP program, and place the Main Board switch to the correct mode.

## 16.5. AST-3G PLUS ENHANCED VIDEO CONTROLLER

### 16.5.1. Characteristics AST-3G Plus

The AST-3G Plus graphics display adapter provides advanced color and high resolution graphics capabilities for the PC. It can perform the functions of four different display adapter cards and allows connection to one of three different types of display monitors.

The AST-3G Plus provides compatibility with the next display adapters:-

- CGA : Color Graphics Adapter (e.g. Persyst, Standard video board)
- MDA : Monochrome Display/Printer Adapter (e.g. Everex, Standard board)
- HGC : Hercules Graphics Card (e.g. Everex, AST-Preview). This is the plus function in the name of this board.
- EGA : IBM Enhanced Graphics Adapter

The next monitors can be connected:-

- Monochrome Monitors (350 line)
- Standard Colour Monitors
- Enhanced Colour Monitors

The on board ROM BIOS gives support for both alphanumeric and graphics modes and replaces for these functions the ROM BIOS of the main board.

Also a parallel port is available on the controller board.

### 16.5.2. Connections AST-3G Plus

J1 Auxiliary jack 1

J2 Auxiliary jack 2

Direct Drive Video Connector J3 (9-D Female)

PIN	SIGNAL NAME
1	GROUND
2	R" secondary RED
3	R primary RED
4	G primary GREEN
5	B primary BLUE
6	G"/I secondary GREEN / Intensity
7	B" MONO second. BLUE / Monochr.
8	HORIZONTAL SYNC
9	VERTICAL SYNC (-N selectable)



# Feature Connector J4

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	GROUND	2	-12V
3	+ 12V	4	J1 (Aux. jack 1)
5	J2 (Aux. jack 2)	6	G"OUT sec. GREEN out
7	R"OUT sec. RED out	8	B"OUT sec BLUE out
9	ATRS/L (shift reg LD)	10	B OUT prim. BLUE out
11	G OUT prim. GREEN out	12	G GREEN input
13	R"sec RED input	14	B prim. BLUE input
15	R prim RED input	16	R OUT prim RED out
17	FEAT 1 out	18	BLANK hor/vert. blank
19	FEAT 0 out	20	FC1 input
21	FC0 input	22	G"/I sec. GREEN/Int.
23	B"/V sec. BLUE/Mono	24	HIN hor. retrace inp.
25	VIN vert. retr. inp.	26	14 MHz from main brd
27	Internal output	28	EXT OSC. output
29	VOUT vert. retr. out	30	HOOT hor. ret. output
31	GROUND	32	+ 5V

# Light Pen Connector P2

PIN	SIGNAL NAME
1	LPEN IN-N
2	N.C.
3	LPEN SW-N
4	GROUND
5	+ 5 VDC
6	+ 12 VDC

Parallel Interface Connector (external 25-D connector female)

This external 25D connector is via an ribbon cable connected to connector P3

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	STROBE-N	14	AUTO FEED-N
2	DATA1	15	ERROR-N
3	DATA2	16	INIT-N
4	DATA3	17	SELECT IN-N
5	DATA4	18	GROUND
6	DATA5	19	GROUND
7	DATA6	20	GROUND
8	DATA7	21	GROUND
9	DATA8	22	GROUND
10	ACK-N	23	GROUND
11	BUSY	24	GROUND
12	PAPER END	25	GROUND
13	SELECT		

### 16.5.3. Strap Settings / Adjustments AST-3G Plus

The four position switch block SW 1, accessible through the cutout at the back of system selects the type of adapter the board will emulate, and whether the AST-3G Plus is the adapter used after power up (primary adapter) or an optional second adapter. The SW2 emulation toggle switch, also accessible at the rear of the system, is used to enable the HGC or CGA emulation. For Hercules or CGA emulation to be invoked at power on time the switch SW2 must be on. After changing switch settings the system must be rebooted. The setting of switch SW2 can be overruled by software.

The next tables summarize the acceptable switch settings together with the monitor type which must be connected. For combinations with other video controllers see section 16.5-5.

**NOTE:** *The AST-3G Plus ROM BIOS extension ignores the main board switch settings for video. It looks at the SW1 switch settings to determine the video mode after start-up of the system.*

AST-3G Plus as Primary Controller, Plus Option Disabled (SW2 OFF) <sup>Here.</sup>

SW1				MONITOR TYPE	AST-3G Plus POWER UP MODE	OPTIONAL SECONDARY ADAPTER
4	3	2	1			
OFF	ON	OFF	OFF	MD	MDA, 80X25	CGA, 80X25
OFF	ON	OFF	ON	MD	MDA, 80X25	CGA, 40X25
OFF	ON	ON	OFF	ECD	EGA, 80X25	MDA, 80X25
OFF	ON	ON	ON	CD*	CGA1 80X25	MDA, 80X25
ON	OFF	OFF	OFF	CD*	CGA1 80X25	MDA, 80X25
ON	OFF	OFF	ON	CD*	CGA1 40X25	MDA, 80X25

AST-3G Plus as Primary Controller, Plus Option Enabled (SW2 ON) <sup>Here.</sup>

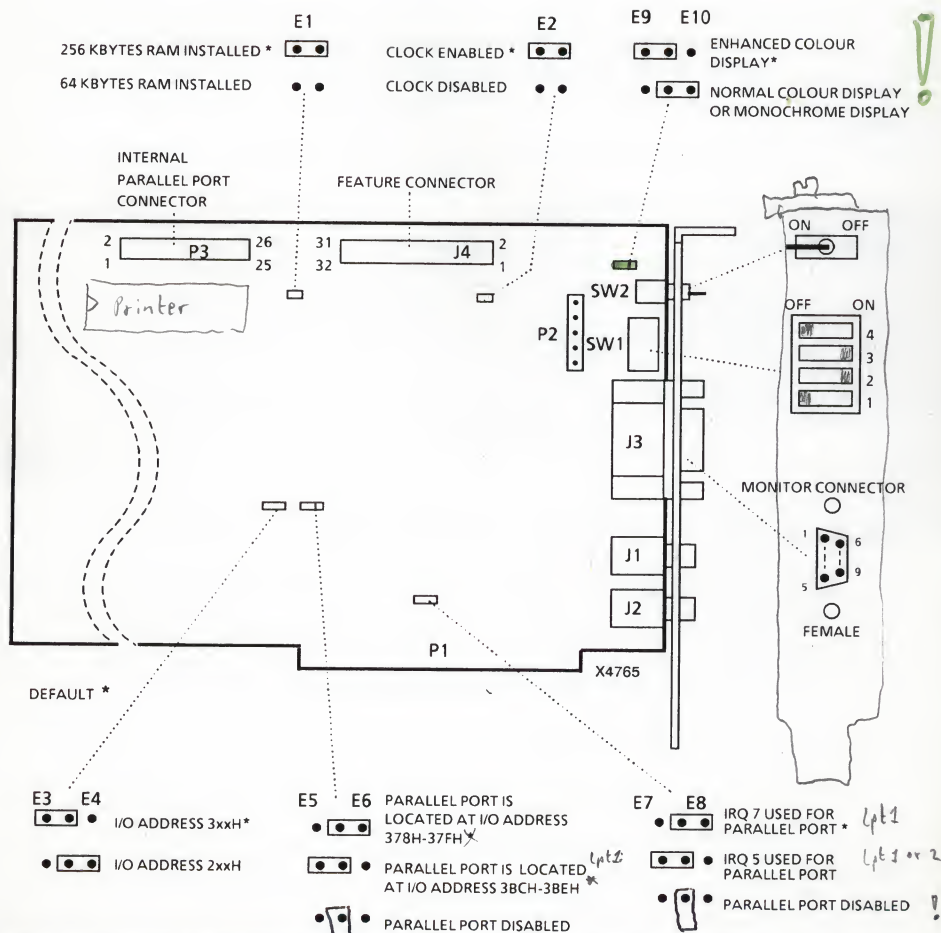
SW1				MONITOR TYPE	AST-3G Plus POWER UP MODE	OPTIONAL SECONDARY ADAPTER
4	3	2	1			
OFF	ON	OFF	OFF	MD	HGC, 80X25	CGA, 80X25
OFF	ON	OFF	ON	MD	HGC, 80X25	CGA, 40X25
OFF	ON	ON	OFF	ECD	CGA2, 80X25	MDA, 80X25
OFF	ON	ON	ON	CD*	CGA2 80X25	MDA, 80X25
ON	OFF	OFF	OFF	CD*	CGA2 80X25	MDA, 80X25
ON	OFF	OFF	ON	CD*	CGA2 40X25	MDA, 80X25

AST-3G Plus as Secondary Controller, Plus Option Disabled (SW2 always OFF) <sup>Here.</sup>

SW1				MONITOR TYPE	PRIMARY ADAPTER	AST-3G Plus POWER UP MODE
4	3	2	1			
ON	OFF	ON	OFF	MD	CGA, 80X25	MDA, 80X25
ON	OFF	ON	ON	MD	CGA, 40X25	MDA, 80X25
ON	ON	OFF	OFF	ECD	MDA, 80X25	EGA, 80X25
ON	ON	OFF	ON	CD*	MDA, 80X25	CGA1 80X25
ON	ON	ON	OFF	CD*	MDA, 80X25	CGA1 80X25
ON	ON	ON	ON	CD*	MDA, 80X25	CGA1 40X25

**NOTES:** CGA1: CGA compatible only at PC-BIOS level.  
 CGA2: Full CGA compatibility.  
 \*An ECD can also be used, but only CD capabilities will be available.

# Strap locations AST-3G Plus



**CAUTION:** It is extremely important to set the strap E9 or E10 correctly because incorrect setting of the strap could damage the monitor.



## Parallel Port Strapping

If another I/O Port is also assigned to the parallel port address 3BC-3BEH, then the AST-3G Plus parallel port must be configured for printer port address 378-37FH. Refer to section 15.1.4. for the possible combinations of parallel port addresses, and the names (given by MS-DOS) belonging to such an address.

### P3400:

Use the following setting when this board is used in the P3400:-

- SW2 (switch): OFF (no emulation)
- Dipswitch SW1

MONITOR	SW1-1	SW1-2	SW1-3	SW1-4
Color	OFF	ON	ON	OFF
Monochrome	OFF	OFF	ON	OFF

## 16.5.5 Installation / Maintenance AST-3G Plus

The board may be installed in any of the option slots on the main board. If two video controllers are installed, one has to operate in color mode and the other in monochrome mode.

The next combinations of display adapters is **NOT** possible:

- AST-3G Plus with AST-3G Plus
- AST-3G Plus with EGA
- AST-3G Plus (in any color mode) with CGA

### WARNING

When the AST-3G Plus coexists with a Hercules Card or a AST-Preview adapter, the Hercules or Preview must not use the second graphics page or damage to either adapter may result. The AST 3G Plus must also be installed as a secondary adapter if previous combinations are made.

## 16.6. AST-PREVIEW

### 16.6.1. Characteristics AST-Preview

This monochrome graphics adapter interfaces any IBM (or compatible) monochrome monitor. The AST-Preview is hardware and software compatible with the Hercules display card (e.g. it allows you to run Lotus 1-2-3 graphics software and many other "business graphics" applications). A display memory of 64 kbyte is available for 2 pages. An Centronics compatible parallel interface is also available on the board.

HGA

## 16.6.2. Connectors AST- Preview

### Video Connector J1

PIN	SIGNAL NAME
1	GROUND
2	GROUND
3	N.C.
4	N.C.
5	N.C.
6	INTENSITY
7	VIDEO
8	HORIZONTAL SYNC
9	VERTICAL SYNC

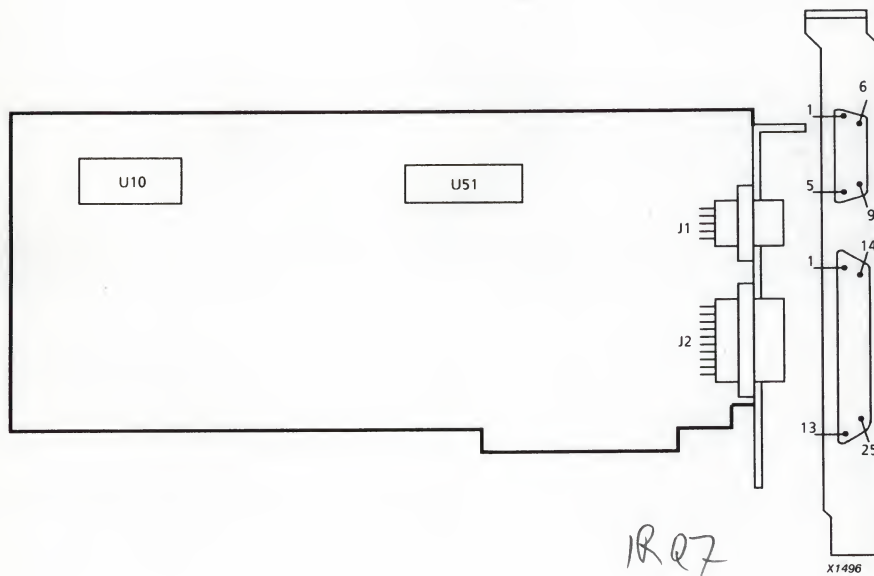


### Parallel Interface Connector J2

PIN	SIGNAL NAME	PIN	SIGNAL NAME
1	STROBE-N	14	AUTOFDXT-N
2	DATA 1	15	ERROR-N
3	DATA 2	16	INIT-N
4	DATA 3	17	SLCTIN-N
5	DATA 4	18	GROUND
6	DATA 5	19	GROUND
7	DATA 6	20	GROUND
8	DATA 7	21	GROUND
9	DATA 8	22	GROUND
10	ACK-N	23	GROUND
11	BUSY	24	GROUND
12	PAPER END	25	GROUND
13	SELECT		

### 16.6.3. Strap Settings / Adjustments AST-Preview

#### Connector Locations AST-Preview





### 16.6.5. Installation / Maintenance AST-Preview

The AST-Preview fits in PC/XT as well as PC/AT slots. For a system where also an IBM compatible colour graphics card is installed, the memory size of the AST-Preview board should be set to 32 kbyte. The software to do this is available on the AST-Preview distribution diskette (SuperPak).

Setting the memory size:

Insert the AST-Preview distribution diskette (SuperPak) in the default drive.

- For 2 Kbyte display memory (text mode only) type:   PREVIEW 1.
- For 32 Kbyte display memory type:                    PREVIEW 2.
- For 64 Kbyte display memory type:                    PREVIEW 3.

**WARNING:** *It is important that only an IBM compatible monitor is connected to the board, as connecting a colour or non-compatible monitor may cause permanent damage to the monitor*

*The parallel interface on the AST-Preview is only designated at I/O address 3BC-3BEH (uses IRQ7) and cannot be disabled by means of a strap.*  
*Remove U5!*

**P320X:**

The P3200 system board should be hardware (SW1-1 OFF/OPEN) and software (using the SETUP program) configured for monochrome mode.

## 16.7. ATI GRAPHICS SOLUTION

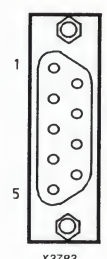
### 16.7.1. Characteristics ATI Graphics Solution

The Graphics Solution combines the video functions of the CGA, the IBM, the HGC, and the Plantronics Colour Plus Adapter all on a single card. The ATI graphics Solution also supports Colour emulation, allowing almost any program that uses CGA mode to display on a monochrome monitor. Colours are converted into shades. It runs these standards on any of the popular monitor types: CD, MD, and Composite Monitor. There are two versions of this board: the ATI Graphics Solution SM and the ATI Graphics Solution SR. Version SR is a later version where the straps are accessible without having to open the system cabinet.

### 16.7.2. Connections ATI Graphics Solution

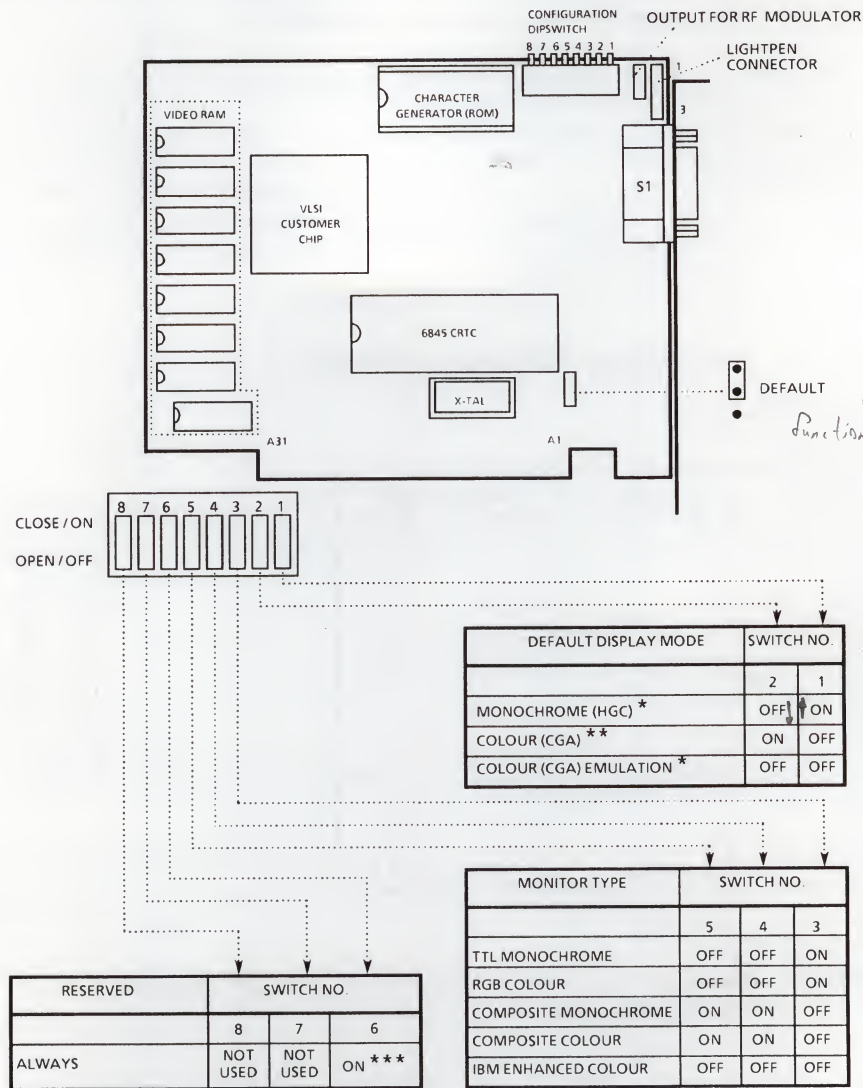
Video Connector S1

PIN	SIGNAL NAME COLOUR MODE	SIGNAL NAME MONOCHR. MODE
1	GROUND	GROUND
2	GROUND	GROUND
3	RED	NOT USED
4	GREEN	NOT USED
5	BLUE	NOT USED
6	INTENSITY	INTENSITY
7	COMPOSITE VIDEO *	VIDEO
8	HORIZONTAL SYNC	HORIZONTAL SYNC
9	VERTICAL SYNC	VERTICAL SYNC-N



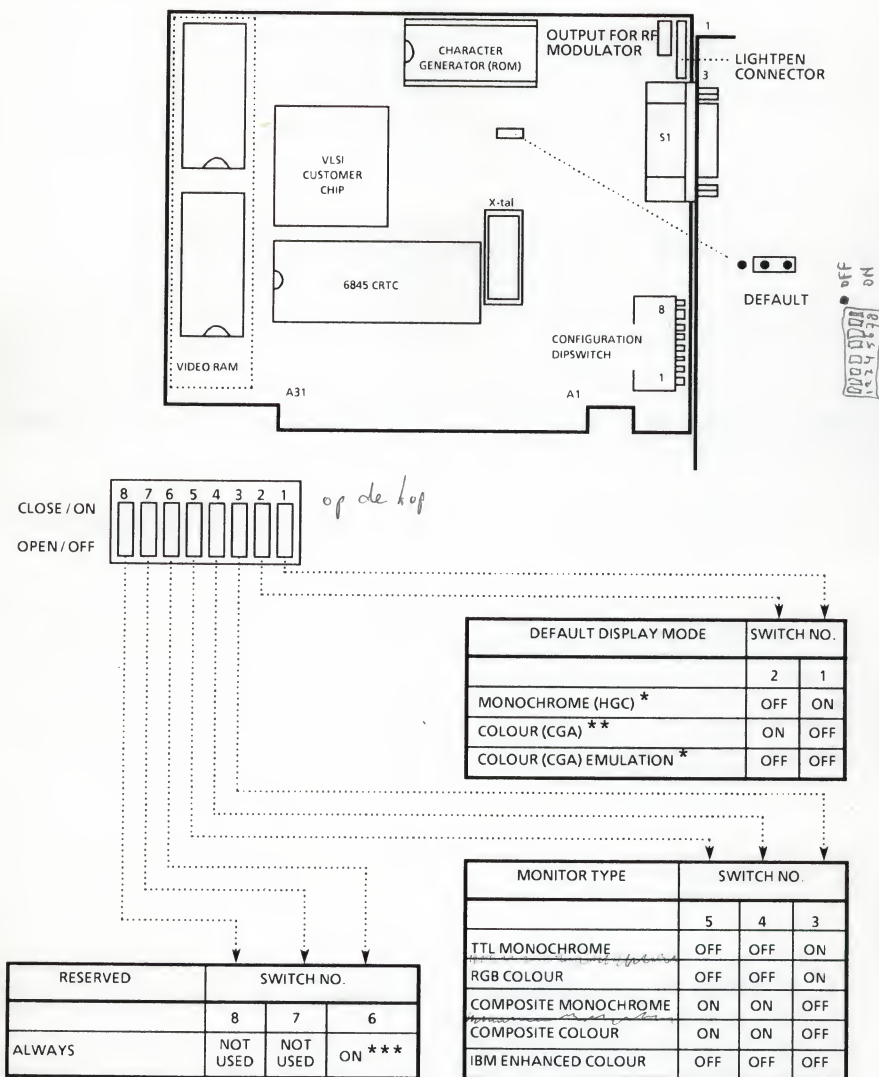
**NOTE:** \* Composite video can be disabled to allow for connection to an IBM enhanced Colour Monitor

### 16.7.3. Strap Settings / Adjustments ATI Graphics Solution



- \* These modes operate on TTL monochrome monitors only.
- \*\* This mode operates on RGB colour, composite monochrome, composite colour, and enhanced colour monitors only.
- \*\*\* Dual freq. monitors SW1-6 off.

**NOTE:** The switches on your PC should be set for the video mode selected on the ATI graphics solution.



- \* These modes operate on TTL monochrome monitors only.
- \*\* This mode operates on RGB colour, composite monochrome, composite colour, and enhanced colour monitors only.
- \*\*\* Dual freq. monitors SW1-6 off.

**NOTE:** The switches on your PC should be set for the video mode selected on the ATI graphics solution.



#### 16.7.4. Modification History ATI Graphics Solution

SI-NR	SUBJECT
P3100-065	Introduction ATI Graphics Solution SR board

#### 16.7.5. Installation / Maintenance ATI Graphics Solution

The ATI Graphic Solution board may be installed in any of the option-board slots on the main board of the system unit.

It is important that the video mode switch settings matches with the monitor type (refer to table of switch settings in section 16.7.3), as failure to match the board outputs to the monitor type can result in damage to the monitor. *+5V pin*

The Graphics Solution board can coexist with other video adapters, in the same system. The possible combinations and exclusions are listed in the table, below.

Graphics Solution operating as:	Co-exists with any video controller as:	Conflicts with any video controller as:
MDA Hercules Graphics Card*	CGA Colour Emulation Adapter Plantronics Adapter	MDA Hercules Graphics Card EGA (graphics 640x350 16 colours) ATI High Resolution
CGA Colour Emulation Adapter Plantronics Adapter	MDA Hercules Graphics Card*	CGA Colour Emulation Adapter EGA (graphics 640x350 16 colours) Plantronics Adapter ATI High Resolution
ATI High Resolution	nothing	everything

\* The second graphics page of the controller functioning as Hercules Graphics Card must be disabled to prevent the two installed video controllers from using the same memory addresses. *how?*

## 16.8. ATI EGA WONDER

### 16.8.1. Characteristics ATI EGA Wonder

The ATI EGA Wonder Video Board runs various video modes: MDA, HGC, CGA, EGA, some VGA. The following types of monitors can be used with this board: CD, ECD, MD, Multi Sync, 25 kHz colour, and Composite Video monitors.

The use of a Multi Sync monitor together with the ATI EGA Wonder makes it possible to work in the VGA (640x480 2 colours or 640x480 16 colours) mode (not supported so far). For more technical information refer to section 16.2.

### 16.8.2. Connections ATI EGA Wonder

Direct Drive Video Connector J3 (DB9 Female)

PIN	SIGNAL NAME COLOUR MODE	SIGNAL NAME MONOCHR. MODE	SIGNAL NAME EGA MODE
1	GROUND	GROUND	GROUND
2	GROUND	GROUND	R" secondary RED
3	RED	NOT CONNECTED	R primary RED
4	GREEN	NOT CONNECTED	G primary GREEN
5	BLUE	NOT USED	B primary BLUE
6	INTENSITY	INTENSITY	G" secondary GREEN
7	RESERVED	VIDEO	B" secondary BLUE
8	HORIZONTAL SYNC *)	HORIZONTAL SYNC *)	HORIZONTAL SYNC *)
9	VERTICAL SYNC	VERTICAL SYNC-N	VERTICAL SYNC-N

**NOTE:** \*) Horizontal Sync or Composite Sync, strap selectable (see section 16.8-3)

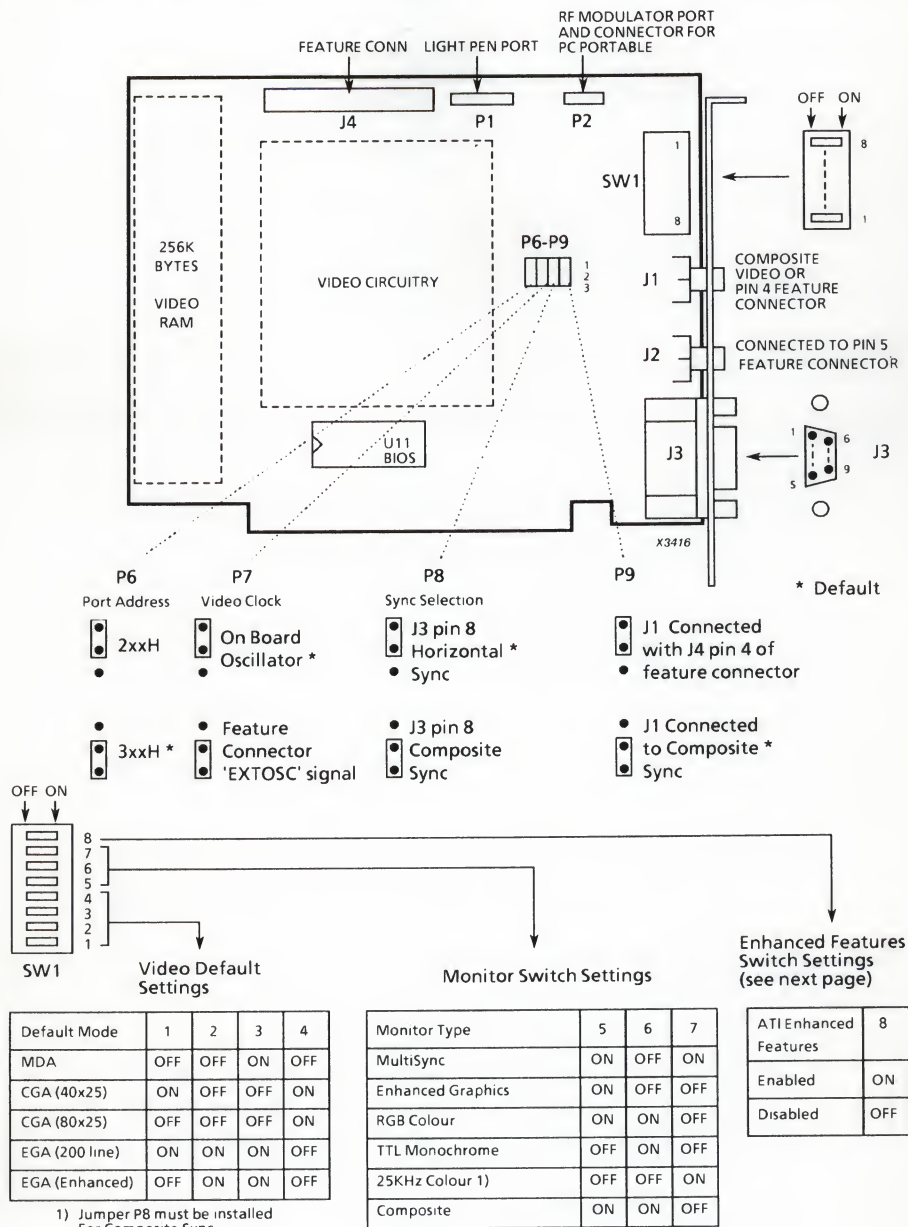
#### Light Pen Connector P1

PIN.	SIGNAL NAME
1	+ LIGHT PEN INPUT
2	NOT USED
3	+ LIGHT PEN SWITCH
4	GROUND
5	+ 5V
6	+ 12V

#### RF Modulator Connector P2

PIN.	SIGNAL NAME
1	+ 12V
2	NOT USED
3	COMPOSITE VIDEO
4	GROUND

### 16.8.3. Strap Settings / Adjustments ATI EGA Wonder





ATI EGA Wonder as Primary Adapter (SW1-8 off, enhanced features disabled)

SW1				MONITOR TYPE	ATI EGA Wonder POWER UP MODE	OPTIONAL SECONDARY ADAPTER
4	3	2	1			
OFF	ON	OFF	OFF	MD	MDA, 80X25	CGA, 80X25
OFF	ON	ON	OFF	ECD	EGA, 80X25	MDA, 80X25
OFF	ON	ON	ON	CD*	CGA1, 80X25	MDA, 80X25
ON	OFF	OFF	OFF	CD*	CGA1, 80X25	MDA, 80X25
ON	OFF	OFF	ON	CD*	CGA1, 40X25	MDA, 80X25

ATI EGA Wonder as Primary Adapter (SW1-8 on, enhanced features enabled)

SW1				MONITOR TYPE	ATI EGA Wonder POWER UP MODE	OPTIONAL SECONDARY ADAPTER
4	3	2	1			
OFF	ON	OFF	OFF	MD	HGC, 80X25	CGA, 80X25
OFF	ON	ON	OFF	ECD	CGA2, 80X25	MDA, 80X25
OFF	ON	ON	ON	CD*	CGA2, 80X25	MDA, 80X25
ON	OFF	OFF	OFF	CD*	CGA2, 80X25	MDA, 80X25
ON	OFF	OFF	ON	CD*	CGA2, 40X25	MDA, 80X25

ATI EGA Wonder as Secondary Adapter (SW1-8 always off, enhanced features disabled)

SW1				MONITOR TYPE	PRIMARY ADAPTER	ATI EGA Wonder POWER UP MODE
4	3	2	1			
ON	OFF	ON	OFF	MD	CGA, 80X25	MDA, 80X25
ON	OFF	ON	ON	MD	CGA, 40X25	MDA, 80X25
ON	ON	OFF	OFF	ECD	MDA, 80X25	EGA, 80X25
ON	ON	OFF	ON	CD*	MDA, 80X25	CGA1 80X25
ON	ON	ON	OFF	CD*	MDA, 80X25	CGA1 80X25
ON	ON	ON	ON	CD*	MDA, 80X25	CGA1 40X25

**NOTES:** CGA1: CGA compatible only at PC-BIOS level.

CGA2: full CGA compatibility.

\* An ECD can also be used, but only CD capabilities are available.

#### 16.8.5. Installation / Maintenance ATI EGA Wonder

The ATI EGA Wonder Video Board may be installed in any of the option-board slots on the main board of the system unit.

It is important that the video mode switch settings matches with the monitor type (refer to table of switch settings in section 16.3.3), as failure to match the board outputs to the monitor type can result in damage to the monitor.

The ATI EGA Wonder Video Board can coexist with other video adapters, also with an ATI Graphics Solution Board or an other EGA Wonder Video Board. The system switches to the primary adapter when powered up. With the help of MSDOS commands it is possible to switch to the other installed board.

For co-existence with other adapters, always take care that no mode, address or interrupt conflicts can occur. Refer to the System Parameters Cross Reference Guide.



EGA 480  
Autoswitch EGA2

## 16.9. PARADISE OEM 6 EGA

### 16.9.1. Characteristics Paradise OEM 6 EGA

The Paradise OEM 6 Enhanced Graphics Adapter combines the video functions of the CGA, the HGC, the Plantronics Colour Plus and the EGA video controller on a single card. It provides extended EGA resolution (640x480) on multisync monitors.

The Paradise OEM 6 EGA automatically reconfigures itself to the graphics mode required by the software in use (when "autoswitching" is enabled).

### 16.9.2. Connections Paradise OEM 6 EGA

Direct Drive Video Connector J4(9-D Female)

PIN	SIGNAL NAME MONOCHR. MODE	SIGNAL NAME COLOUR MODE	SIGNAL NAME EGA MODE
1	GROUND	GROUND	GROUND
2	GROUND	GROUND	R" secondary RED
3	RED	RED	R primary RED
4	GREEN	GREEN	G primary GREEN
5	BLUE	BLUE	B primary BLUE
6	INTENSITY	INTENSITY	G" secondary GREEN
7	VIDEO	NOT USED	B" secondary BLUE
8	HORIZONTAL SYNC	HORIZONTAL SYNC	HORIZONTAL SYNC
9	VERTICAL SYNC	VERTICAL SYNC	VERTICAL SYNC

Light Pen Connector P1

PIN	SIGNAL NAME
1	LIGHTPEN IN
2	N.C.
3	LIGHTPEN SWITCH
4	GROUND
5	+ 5 VDC
6	+ 12 VDC



### 16.9.3. Strap Settings / Adjustments Paradise OEM 6 EGA

The five position switch block, accessible through the cutout at the back of the system, is used to select the power up mode, and whether the Auto Switch Option is enabled.

Paradise OEM 6 EGA as Primary Controller

SW1				PARADISE POWER UP MODE	OPTIONAL SECONDARY ADAPTER
1	2	3	4		
OFF	OFF	ON	OFF	MDA, 80X25	CGA, 80X25
ON	OFF	ON	OFF	MDA, 80X25	CGA, 40X25
ON	OFF	OFF	ON	CGA, 40X25	MDA, 80X25
OFF	OFF	OFF	ON	CGA, 80X25	MDA, 80X25
ON	ON	ON	OFF	EGA (200 LINE MODE) <i>emu</i>	MDA, 80X25
OFF	ON	ON	OFF	EGA	MDA, 80X25

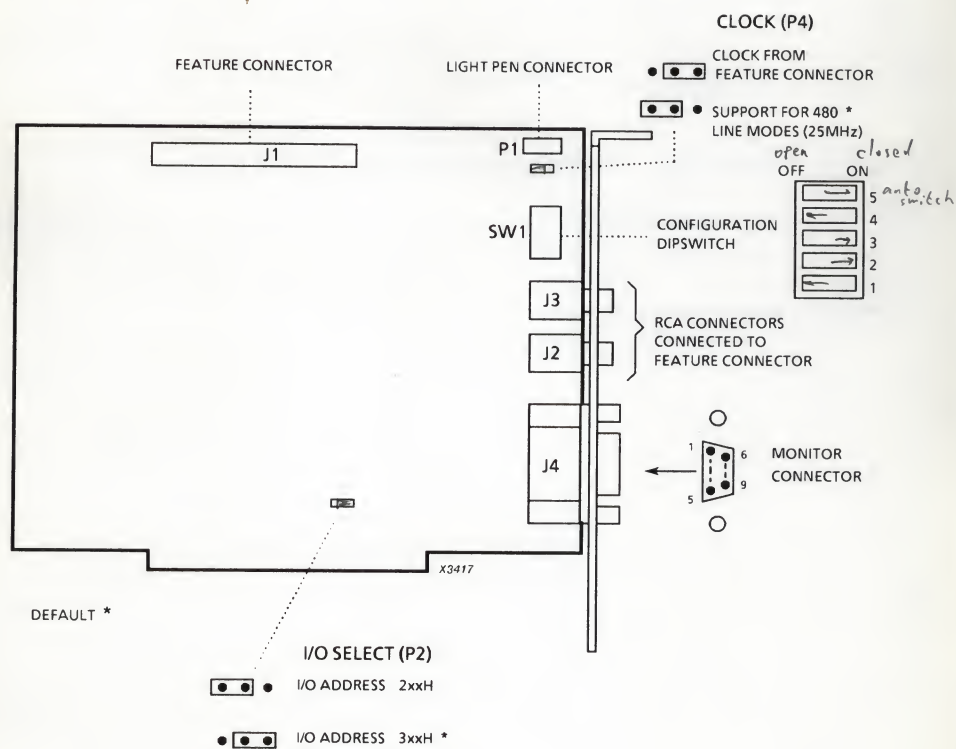
Paradise OEM 6 EGA as Secondary Controller

SW1				PARADISE POWER UP MODE	PRIMARY ADAPTER
1	2	3	4		
ON	ON	ON	ON	CGA, 40X25	MDA, 80X25
OFF	ON	ON	ON	CGA, 80X25	MDA, 80X25
ON	OFF	ON	ON	EGA (200 LINE MODE)	MDA, 80X25
OFF	OFF	ON	ON	EGA	MDA, 80X25
ON	ON	OFF	ON	MDA, 80X25	CGA, 40X25
OFF	ON	OFF	ON	MDA, 80X25	CGA, 80X25

AUTOSWITCH OPTION	SW 1-5
Disabled <i>UNIX &amp; XENIX</i>	Off
Enabled	On

**NOTE:** SW5 should be set to off

1. if UNIX or XENIX installed
2. in two monitor configurations



#### 16.9.4. Modification History Paradise OEM 6 EGA

12NC	SUBJECT
03180	EGA Video Controllers (Introduction Paradise OEM 6 EGA).
03181	Solution for intermittent errors in an 8 MHz system

The numbers are the last 5 digits of the 12NC number (5107 029 xxxxx).

#### 16.9.5. Installation / Maintenance Paradise OEM 6 EGA

The board may be installed in any of the option slots on the main board. If two video controllers are installed, one has to operate in colour mode and the other in monochrome mode. This video board can coexist with other video adapters. Refer to the tables on the previous pages.

system series: P3000 model: P3109-141 main assy: nr: P3000-121  
Paradise OEM6 EGA

units affected: Rev. 1

est.time: 10 minutes

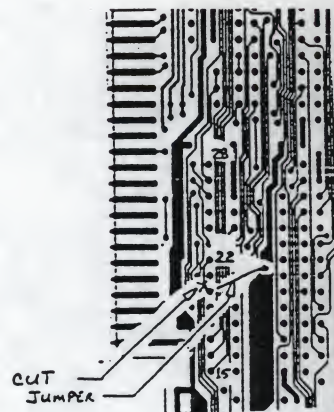
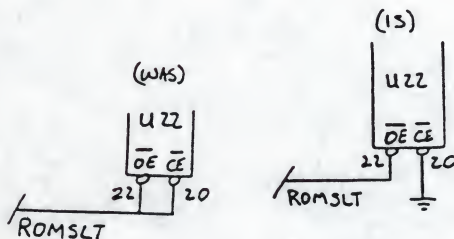
date: 6-03-1989 revised:

title: Workshop rework to solve problems with  
OEM6 in 8MHz systems.

this change is: Retrofit on failure

note:

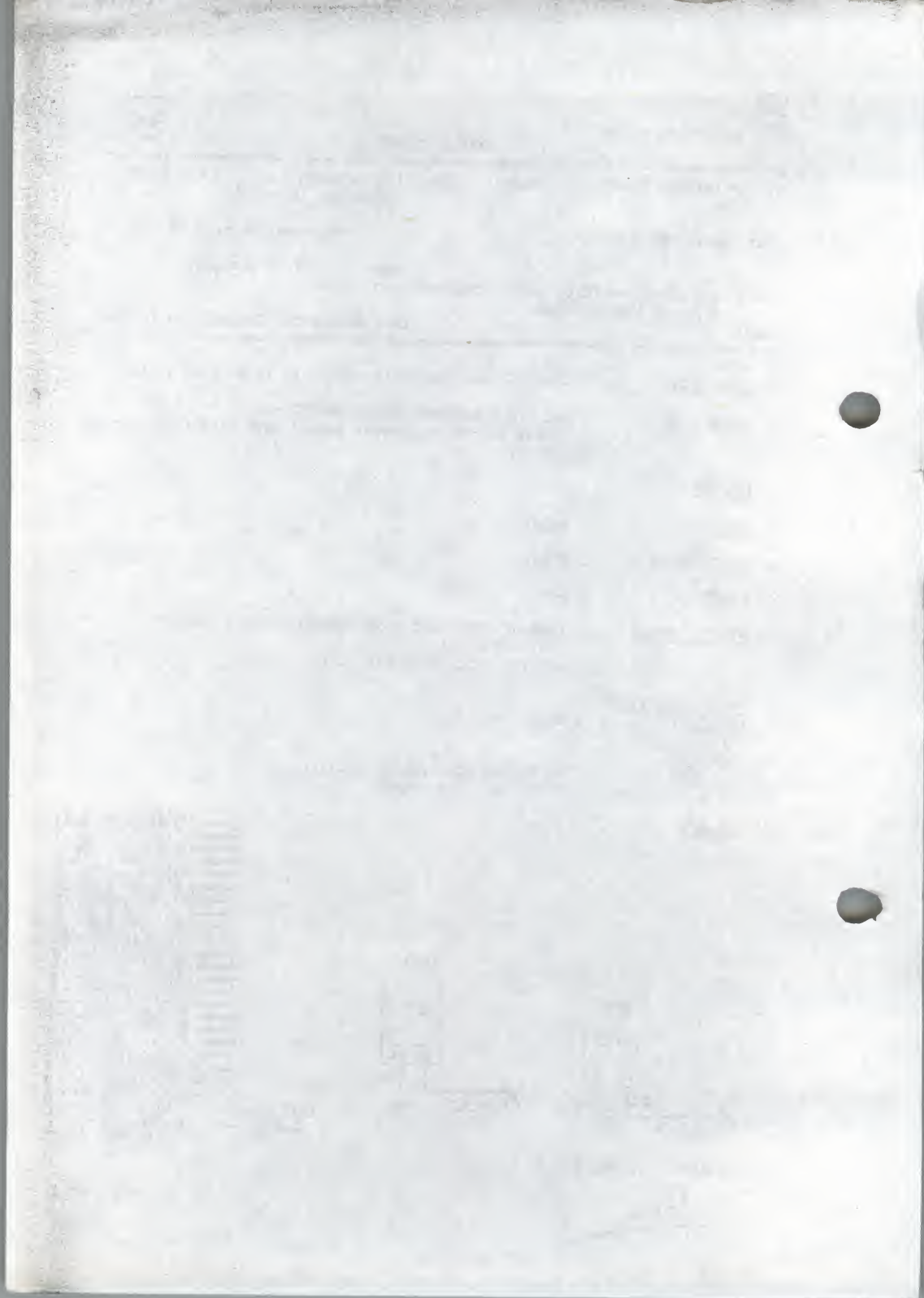
1. CONDITION : OEM6 EGA has intermittent errors in an 8MHz system.
2. CORRECTION : Cut trace between U22-20 and U22-22, <sup>or CE116</sup>  
Jumper U22-20 to closest ground path (see illustration below).
3. REMOVE : None.
4. ADD : None.
5. ADJUSTMENTS : None.
6. PARTS : None.
7. STATUS CHANGE : 12NC of OEM6 card goes from 5107 029 03180 to  
5107 029 03181  
Service 12NC: 5322 216 22772.
8. TEST FACILITIES  
AFFECTED : None.
9. DOCUMENTS  
AFFECTED : WE Manual PC Video controllers.  
12NC: 5122 991 36091.
10. REMARKS : None.



Responsibility: Rob Kayzer

*Rob Kayzer*





## EGA 480 Software

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The box containing the EGA 480 Card also includes a diskette. The programs on the diskette fall into two categories: software drivers allowing popular applications software to access 480 line/132 column modes, and programs designed to maximize the use of the EGA 480 Card. Refer to the EGA 480 Software Manual for information concerning software drivers. The two programs designed to maximize the EGA 480 Card are discussed below.

ROMCHECK.COM allows owners of early IBM PCs to check for BIOS compatibility with the EGA 480 Card. EGA.EXE allows users to select the operational mode of the card either from a menu or directly from the DOS prompt line.

**ROMCHECK.COM:** As described earlier, the computer system ROM BIOS must be able to recognize the presence of the BIOS extensions on the EGA 480 Card. Early IBM PCs (those with a BIOS date prior to October 27, 1982) do not have this capability. ROMCHECK.COM is a program that determines the computer system BIOS date.

It is not necessary to install the EGA 480 Card prior to running ROMCHECK.COM. The program will work in most IBM compatible computers, but the October 1982 "compatibility date" only holds true for IBM computers.

To invoke this program, simply start your computer system. At the DOS prompt, insert the diskette in drive A and type:

ROMCHECK [ENTER]

**EGA.EXE:** This program allows users to manually select the operational mode of the EGA 480 Card either from a menu or directly from the DOS prompt line. EGA.EXE overrides the lever 5 DIP switch. As discussed in the EGA 480 Card DIP switch section of Installation, lever 5 of the DIP switch located on the back of the EGA 480 Card sets the default mode of operation (Intelligent Mode Selection or pure EGA) when the





computer is started. EGA.EXE will override this setting, allowing the mode to switch back and forth between Intelligent Mode Selection and a compatibility mode such as Hercules, as appropriate for the monitor in use.

EGA.EXE also lets you start a game disk that otherwise might not run on an EGA 480 Card because of exotic copy protection schemes.

To invoke this program, simply start your computer system. At the DOS prompt, insert the diskette in drive A and type:

EGA [ENTER]

A menu will appear, listing several options. Those available will be highlighted (inverse text). Menu options not appropriate for the monitor or configuration of the system will be in normal text. Use the up and down arrows to select a highlighted feature. When the desired feature is selected (blinking), press the [ENTER] key.

EGA.EXE can also be run from the DOS prompt line, bypassing the menu. This is useful for incorporating EGA.EXE commands into a batch file. Below is a listing, and explanation, of the various EGA.EXE parameters which can be typed from the DOS prompt:

- |                 |  |
|-----------------|--|
| EGA [ENTER]     | EGA menu appears.  |
| EGA EGA [ENTER] | Turns OFF Intelligent Mode Selection, restricting card to EGA operation.   |
| EGA CGA [ENTER] | (For use with color displays.) Turns off Intelligent mode. Switches to <b>CGA mode</b> . If you are using an enhanced color display in 350 line mode, the Card will switch to 200 line mode as if you had an actual CGA card. A warm boot (Control-Alt-Del key sequence) will bring you back to the default mode specified by lever 5 of the DIP switch unless "lock" parameter is used (see below). |





EGA PLANT [ENTER] (For use with color displays.) Turns off Intelligent mode. Switches to **Plantronics mode**. If you are using an enhanced color display in 350 line mode, the Card will switch to 200 line mode as if you had an actual Plantronics card. A warm boot (Control-Alt-Del key sequence) will bring you back to the default mode specified by lever 5 of the DIP switch unless "lock" parameter is used (see below).

EGA MDA [ENTER] (For use with monochrome displays.) Turns off Intelligent mode. Switches to **Monochrome text mode**. A warm boot (Control-Alt-Del key sequence) will bring you back to the default mode specified by lever 5 of the DIP switch unless "lock" parameter is used (see below).

EGA HERC0 [ENTER] (For use with monochrome displays.) Turns off Intelligent mode. Switches to **Hercules half mode**. (Equivalent to using the Hercules HGC Half command). A warm boot (Control-Alt-Del key sequence) will bring you back to the default mode specified by lever 5 of the DIP switch unless "lock" parameter is used (see below).

EGA HERC1 [ENTER] (For use with monochrome displays.) Turns off Intelligent mode. Switches to **Hercules full mode**. (Equivalent to using the Hercules HGC Full command). A warm boot (Control-Alt-Del key sequence) will bring you back to the default mode specified by lever 5 of the DIP switch unless "lock" parameter is used (see below).

The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that proper record-keeping is essential for ensuring the integrity and transparency of the financial system. The document also highlights the need for regular audits and reviews to identify any potential issues or discrepancies.

Page 102 of 102

The second part of the document focuses on the role of the accounting department in providing accurate and timely financial information. It outlines the various responsibilities of the accounting team, including the preparation of financial statements, the management of accounts payable and receivable, and the oversight of budgeting and forecasting processes.

Page 102 of 102

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## EGA 480 Software

**EGA LOCK [ENTER]** Locks the current mode so that it will survive a "warm boot" if used alone. Locks the requested mode if used in conjunction with another parameter.

**EGA AUTO [ENTER]** Sets Intelligent Mode Selection and returns to EGA if necessary. Unlocks mode if necessary.

**EGA BOOT [ENTER]** Prompts the user to insert a disk in drive A and press a key to boot a disk. Used in conjunction with specific video mode parameters and/or LOCK parameter to run protected game program.

If the current mode is locked, any command specifying a video mode, such as EGA CGA, will unlock the card (unless used with the LOCK parameter).

If you make a mistake typing the EGA command, the program gives you the option of using the EGA menu or returning to DOS.

More than one EGA command line can be used. The example below sets the EGA 480 Card to start a protected CGA game disk.

### EGA CGA BOOT [ENTER]

**Copy protection:** The diskette supplied with the EGA 480 Card is not copy protected. Use the DOS COPY command to make a backup copy of this diskette, and store the original. We recommend that you backup the EGA 480 Card disk before using any of the programs on the disk.



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## 16.10. ATI SMALL WONDER GRAPHICS SOLUTION

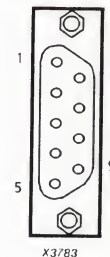
### 16.10.1. Characteristics ATI Small Wonder Graphics Solution

The Small Wonder Graphics Solution combines the video functions of the CGA, the IBM, the HGC, and the Plantronics Colour Plus Adapter all on a single card. The ATI Small Wonder Graphics Solution also supports Colour emulation, allowing almost any program that uses CGA mode to display on a monochrome monitor. Colours are converted into shades. It runs these standards on any of the popular monitor types: CD, MD, and Composite Monitor.

### 16.10.2. Connections ATI Small Wonder Graphics Solution

Video Connector P1

PIN	SIGNAL NAME COLOUR MODE	SIGNAL NAME MONOCHR. MODE
1	GND	GND
2	(R) Secondary	GND
3	(R) RED	NOT USED
4	(G) GREEN	NOT USED
5	(B) BLUE	NOT USED
6	(I) INTENSITY	INTENSITY
7	NOT USED	VIDEO
8	HORIZONTAL SYNC	HORIZONTAL SYNC
9	VERTICAL SYNC	VERTICAL SYNC-N



Composite Video Connector P2

PIN	SIGNAL NAME
1	COMPOSITE OUT
2	GROUND

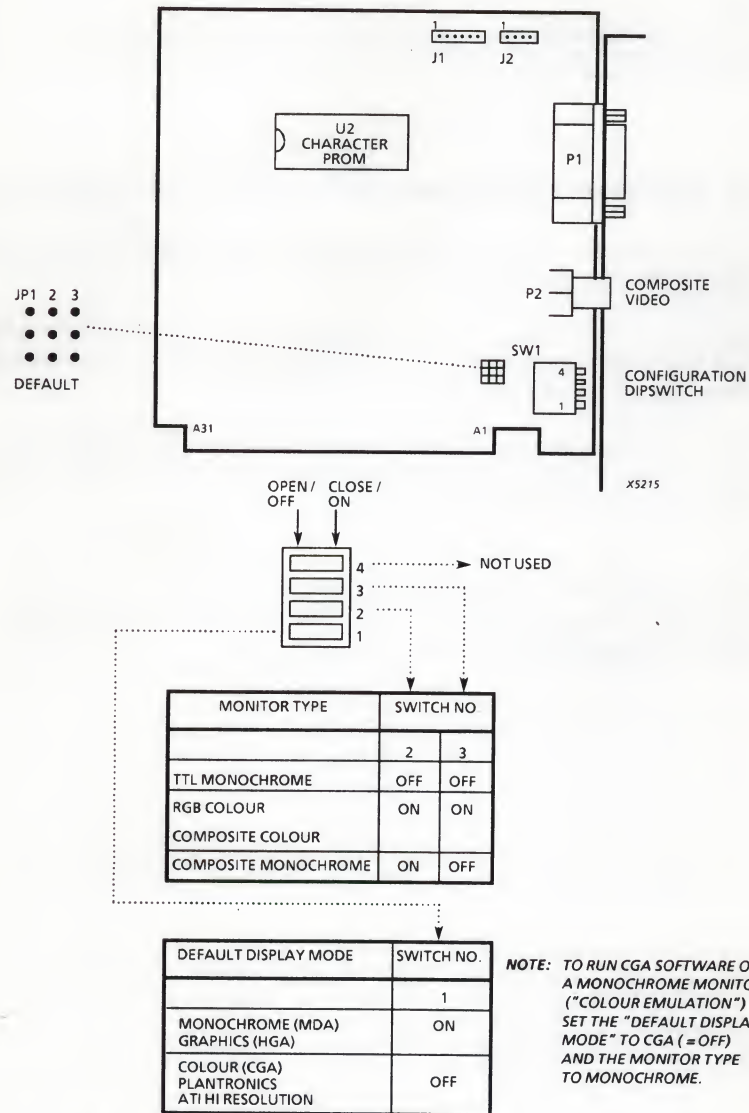
Light Pen Connector J1

PIN.	SIGNAL NAME
1	+ LIGHT PEN INPUT
2	KEY
3	+ LIGHT PEN SWITCH
4	GROUND
5	+5V
6	+12V

RF Modulator Connector J2

PIN.	SIGNAL NAME
1	+12V
2	KEY
3	COMPOSITE VIDEO
4	GROUND

### 16.10.3. Strap Settings / Adjustments ATI Small Wonder Graphics Solution



Version 2 SMD video RAM

Version 2 DIL video RAM - larger board



#### 16.10.4. Modification History ATI Small Wonder Graphics Solution

SI-NR	SUBJECT
P3000-083	ATI small wonder video controller (Introduction ATI Small Wonder Graphics Solution).

#### 16.10.5. Installation / Maintenance ATI Small Wonder Graphics Solution

The ATI Small Wonder Graphic Solution board may be installed in any of the option board slots on the main board of the system unit.

It is important that the video mode switch settings matches with the monitor type (refer to table of switch settings in section 16.10.3), as failure to match the board outputs to the monitor type can result in damage to the monitor.

The Small Wonder Graphics Solution board can coexist with other video adapters. Take care that no mode, address or interrupt conflicts can occur. Refer to the System Parameters Cross Reference Guide.

##### **P320X:**

Running CGA Emulation on a Monochrome Monitor:

1. Set P320X main board SW1-1, for colour monitor: SW 1-1 = ON (closed).
2. In SETUP the primary video display must be 'Colour'.

## 16.11. Paradise OEM8 VGA

### 16.11.1. Characteristics Paradise OEM8 VGA

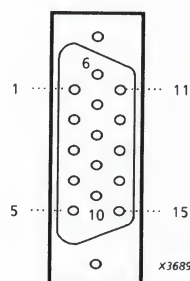
The Paradise OEM8 VGA is a half size card that provides enhanced VGA (Video Graphics Array) capability. The Paradise OEM8 VGA has a 8-bit interface to the PC bus. The external interface provides a means to connect an external analog monitor. To interface this monitor, a 15-pin D-type connector with 31.5Khz outputs is used. Support for TTL signals is not available. Connection of a monochrome monitor will automatically change the output signal to be monochrome compatible. All modes are available on all displays that can be connected to the VGA card (except 800x600 extended graphics, which is only available on multifrequency monitors). For an overview of possible modes refer to section 16.1.2..

### 16.11.2. Connections Paradise OEM8 VGA

Video Connector J1

PIN	FUNCTION
1	Red Video
2	Green Video
3	Blue Video
4	Monitor ID Bit 2 (Not Used)
5	Ground
6	Red Return (Ground)
7	Green Return (Ground)
8	Blue Return (Ground)
9	Key (No Connection)
10	Sync Return (Ground)
11	Monitor ID Bit 0 (Not Used)
12	Monitor ID Bit 1 (Not Used)
13	Horizontal Sync
14	Vertical Sync
15	Not Connected

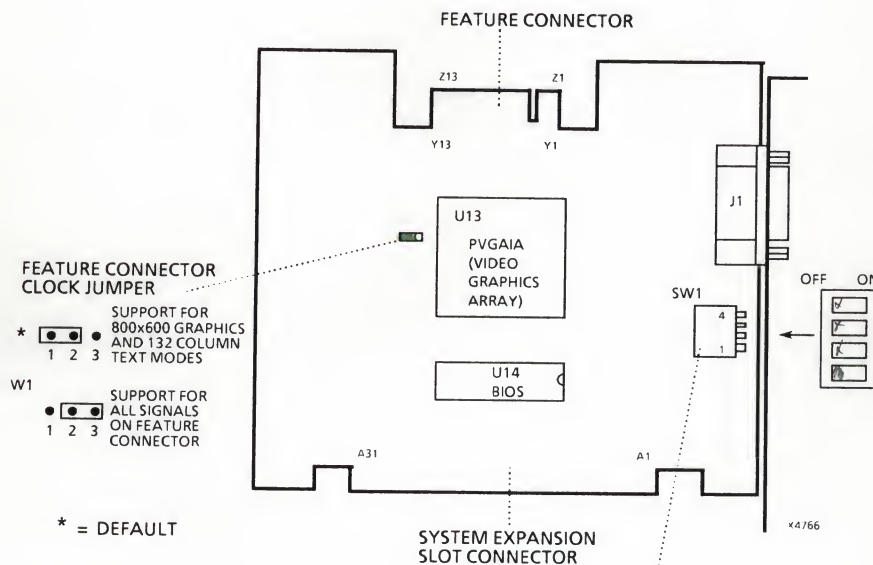
Monochrome monitors use Green Video for all video input and ignore Red Video and Blue Video



J1 VIDEO PORT CONNECTOR

PIN	FUNCTION	PIN	FUNCTION
Y1	PD0	Z1	Ground
Y2	PD1	Z2	Ground
Y3	PD2	Z3	Ground
Y4	PD3	Z4	Select Internal Video
Y5	PD4	Z5	Select Internal Syncs
Y6	PD5	Z6	Select Internal DAC
Y7	PD6	Z7	Not Used
Y8	PD7	Z8	Ground
Y9	DAC Clock	Z9	Ground
Y10	DAC Blanking	Z10	Ground
Y11	Ext. HoSync	Z11	Ground
Y12	Ext. Vert. Sync	Z12	Not Used
Y13	Ground	Z13	Not Used

### 16.11.3. Strap Settings / Adjustments Paradise OEM8 VGA



SWITCH	SETTING	MONITOR CHARACTERISTICS		
		VERTICAL RESOLUTION (LINES)	HORIZONTAL SYNC (KHZ)	VERTICAL SYNC (HZ)
SW1-1	OFF <i>standard PS/2</i>	132	31.5 (negative)	70.0 (positive)
		200	31.5 (negative)	70.1 (positive)
		350	31.5 (positive)	70.1 (negative)
		400	31.5 (negative)	70.1 (positive)
		480	31.5 (negative)	59.9 (negative)
		600	35.2 (negative)	56.2 (negative)
	ON <i>multi-Freq</i>	132	27.6 (negative)	61.5 (positive)
		200	28.0 (negative)	62.3 (positive)
		350	31.5 (positive)	62.3 (negative)
		400	31.5 (negative)	62.3 (positive)
		480	31.5 (negative)	59.9 (negative)
		600	35.2 (negative)	56.2 (negative)
SW1-2 THR SW1-4	NOT USED			

**Note:** Refer to the sections detailing the VGA monitors in chapter 21



#### 16.11.5. Installation / Maintenance Paradise OEM8 VGA

The Paradise OEM8 VGA board may be installed in any of the option-board slots on the main board of the system unit. Hercules compatible software and some CGA compatible software will require using the VGA.EXE utility to set the card to the appropriate video standard. (A menu will be displayed after entering: VGA <return> )

This utility also has to be used when software requires a certain video mapping (e.g: If the VGA card is in colour text mode and you want to run a program that requires monochrome text).

# P3109-142 VGA Video Card

## IBM VGA Compatible

PS/2 video card featuring 100% downward compatibility with pre-VGA standards such as EGA, MDA, Hercules, CGA and Plantronics

### SPECIFICATIONS P3109-142

#### DESCRIPTION

The P3109-142 VGA has the following basic features:

- 100% IBM-VGA hardware compatible
- Full downward compatibility
- High Performance
- Half sized card

#### PHYSICAL CHARACTERISTICS

- Fits any IBM PC/XT/AT expansion slot
- Height 4.2 inches
- Length 7 inches
- Weight 6 ounces

#### VIDEO

- 15 pin connector for all supported monitor types
- Same feature connector as on IBM PC VGA board
- 8 bit PC bus connector

#### SOFTWARE/MONITOR COMPATIBILITY

- Multifrequency RGB monitors, all modes
- IBM 8503, 8512, 8513
- Monitors and compatibles all modes

#### APPLICATIONS SOFTWARE SUPPORTED

- Software 640 X 480, 132 col.
- AutoCAD 2.18 or higher\*
- CAD Vance\*

- GEM 2.1\*
- Ventura Pub. 1.00 or higher\*
- Microsoft Windows\*
- PageMaker (Windows)\*
- EGA Paint 2005\*
- Symphony\*
- Lotus 1-2-3 rel 2\*\*
- Framework II\*\*
- WordStar rel 3.3\*
- WordStar Prof. rel 4\*
- WordPerfect\*

#### MANUFACTURER/MODEL

- Paradise Systems Inc.
- Paradise OEM 8 VGA Card

#### POWER

- Voltage +5V (5% regulation)
- Current demand nominal .75A (5V)
- Average power consumption 4 Watts
- EMI (Electromagnetic Interference) FCC Class B

#### ENVIRONMENTAL REQUIREMENTS

- Operating temperature +4°C to +55°C
- Storage temperature -40°C to +65°C
- Relative Operating Humidity 8% to 80%
- Relative Storage Humidity 5% to 95%

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## 16.12. PHILIPS 8/16 VGA

### 16.12.1. Characteristics PHILIPS 8/16 VGA

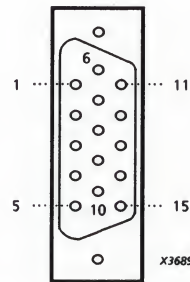
The PHILIPS 8/16 VGA is a half size card that provides enhanced VGA (Video Graphics Array) capability. The PHILIPS 8/16 VGA supports the PC/AT-bus interface. The external interfaces provide a means to connect external analog as well as digital monitors. To interface the analog monitor, a 15-pin male D-type connector is used. The digital monitor is interfaced through a 9-pin male D-type connector. The active video mode is selected by means of five dip switches as described in sub-section 16.12.3.. For an overview of all possible modes refer to sub-section 16.1.2..

### 16.12.2. Connections PHILIPS 8/16 VGA

Video Connector J1 (analog video)

PIN	FUNCTION
1	Red Video (analog)
2	Green Video (analog)
3	Blue Video (analog)
4	Monitor ID Bit 2
5	Ground
6	Red Return (Ground)
7	Green Return (Ground)
8	Blue Return (Ground)
9	Key (No Connection)
10	Sync Return (Ground)
11	Monitor ID Bit 0
12	Monitor ID Bit 1
13	Horizontal Sync
14	Vertical Sync
15	Reserved

Monochrome monitors use Green Video for all video input and ignore Red Video and Blue Video



J1 VIDEO PORT CONNECTOR



# Video Connector J2 (digital video)

PIN	SIGNAL NAME COLOUR MODE
1	GND
2	(R) Secondary
3	(R) RED
4	(G) GREEN
5	(B) BLUE
6	(G) Secondary
7	(B) Secondary
8	HORIZONTAL SYNC
9	VERTICAL SYNC

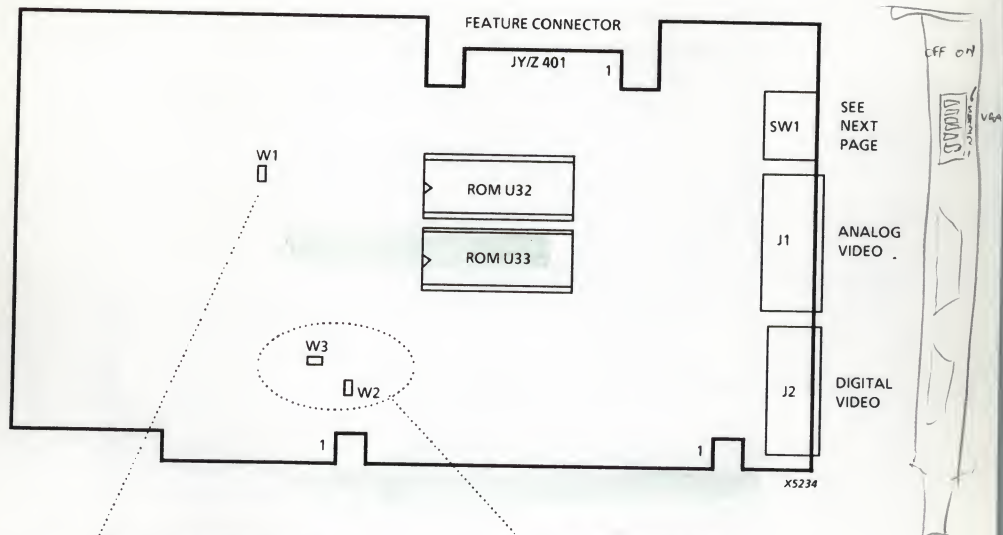


X3783

## Feature Connector JY/JZ401

COMPONENT SIDE JY-401		SOLDER SIDE JZ-401	
PIN	NAME	PIN	NAME
1	P0	1	GND
2	P1	2	GND
3	P2	3	GND
4	P3	4	INTVID
5	P4	5	INTSYNC
6	P5	6	INTCLK
7	P6	7	N.C.
8	P7	8	GND
9	FEATCLK	9	GND
10	DACBLNK-N	10	GND
11	HSYNC	11	GND
12	VSNC	12	N.C.
13	GND	13	N.C.

### 16.12.3. Strap Settings / Adjustments Philips 8/16 VGA



**W1: INTERRUPT GENERATION ON VERTICAL SYNC**

- **DISABLED \***
- **ENABLED**

**W2/3: 8/16 BIT COMMUNICATION**

- **16 BIT BIOS AT-SLOT**
- **8 BIT BIOS XT-SLOT \***

**\* DEFAULT SETTING**

- **8 BIT BIOS AT-SLOT**

*default P3230 (12MHz)*

**NOTE: ROM U33 MAY BE REMOVED IN 8 BIT BIOS MODE**

# VGA Controller only Adapter in System

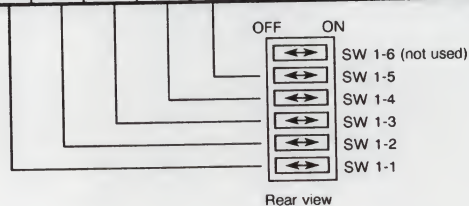
SWITCH #					MONITOR
1-1	1-2	1-3	1-4	1-5	
OFF	OFF	ON	OFF	OFF	MD
OFF	ON	ON	OFF	OFF	ED 350 line
ON	ON	ON	OFF	OFF	ED 200 line
OFF	OFF	OFF	ON	OFF	CD 80*25
ON	OFF	OFF	ON	OFF	CD 40*25
X	X	X	X	ON	ANALOGUE

## Two Controllers; VGA Controller as Primary Adapter

SWITCH #					ADAPTER	
1-1	1-2	1-3	1-4	1-5	PRIMARY	SECONDARY
OFF	OFF	ON	OFF	OFF	EGA MD	CGA 80*25 or none
ON	OFF	ON	OFF	OFF	EGA MD	CGA 40*25
OFF	ON	ON	OFF	OFF	EGA ED 350 line	MDA or none
ON	ON	ON	OFF	OFF	EGA ED 200 line	MDA or none
OFF	OFF	OFF	ON	OFF	EGA CD 80*25	MDA or none
ON	OFF	OFF	ON	OFF	EGA CD 40*25	MDA or none

## Two Controllers; VGA Controller as Secondary Adapter

SWITCH #					ADAPTER	
1-1	1-2	1-3	1-4	1-5	PRIMARY	SECONDARY
OFF	ON	OFF	ON	OFF	CGA 80*25	EGA MD
ON	ON	OFF	ON	OFF	CGA 40*25	EGA MD
OFF	OFF	ON	ON	OFF	MDA	EGA ED 350 line
ON	OFF	ON	ON	OFF	MDA	EGA ED 200 line
OFF	ON	ON	ON	OFF	MDA	EGA CD 80*25
ON	ON	ON	ON	OFF	MDA	EGA CD 40*25



### NOTES:

EGA = Enhanced Graphics Adapter, ED = Enhanced colour Display  
CGA = Colour Graphics Adapter, CD = Colour Display  
MDA = Monochrome Display Adapter, MD = Monochrome Display  
VGA = Video Graphics Array



#### 16.12.4. Modification History Philips 8/16 VGA

5107 265 2701X (XT - strapped)	SUBJECT	5107 265 2571X (AT - strapped)	SUBJECT
5107 265 27011	Not used.	5107 265 25711	Not used.
5107 265 27012	Prototype only.	5107 265 25712	Prototype only.
5107 265 27013	Error on BOM and removal of extra components; Artwork problem, cut trace location W3; Oscillator U13 removed.	5107 265 25713	Artwork problem, cut trace location W3. Oscillator U13 removed; Remove oscillator 32 Mhz.
5107 265 27014	New BIOS 1.12.2 (12NC : 5107 299 61672) Remove oscillator 32 Mhz; Error on BOM, wrong artwork number.	5107 265 25714	New BIOS 1.12.2 (12NC : 5107 299 61672)
5107 265 27015	Timing problem when used in 16-bit mode in P3230.		
5107 265 27016	Unwanted greyish shades at both sides of a dark coloured window. Remove capacitor at location C57.	5107 265 25715	Unwanted greyish shades at both sides of a dark coloured window. Remove capacitor at location C57.
5107 265 27017	New IC on position U50	5107 265 25716	New IC on position U50
5107 265 27018	82C415B changed by 82C451C	5107 265 25717	82C415B changed by 82C451C
5107 265 27019	Capacitors added for FCC approval in P3361	5107 265 25718	Capacitors added for FCC approval in P3361
5107 265 32201*	Introduction P3464 version with BIOS 1.12.2		
5107 265 27021	Administrative change	5107 265 25719	Administrative change
5107 265 27022	New BIOS 1.12.5 5 (12NC: 5107 299 61673)	5107 265 25721	New BIOS 1.12.5 5 (12NC: 5107 299 61673)
5107 265 32202*	New BIOS 1.12.5 ) (12NC: 5107 299 61673)		

*Note: 5107 265 322xx P3464 only. Two BIOS proms present on positions U32 and U33 Straps W2 and W3 present.*

#### 16.12.5. Installation / Maintenance Philips 8/16 VGA

The Philips 8/16 VGA board may be installed in any of the option-board slots on the main board of the system unit. The strap settings determine the mode of operation. With W2 and W3 both inserted (default) the board will automatically configure itself for either 16-bit (AT slot) or 8-bit (XT slot) operation. Be sure that the card's dipswitches have been properly set (sub-section 16.12.3.).





Philips VGA 451

# P3109-104 VGA (TTL) Video Card

## 8/16 Bit VGA Card

## Analog/TTL VGA Card

### SPECIFICATIONS P3109-104

#### DESCRIPTION

The Philips Analog/TTL - 8/16 bit Video Graphics Array Adapter is 100% IBM VGA compatible at Gate, Register and BIOS levels. In addition, it offers a set of extended capabilities which provide greater functionality and higher-quality images from your VGA-compatible display while maintaining compatibility with your Philips XT or AT systems. All software will run on a VGA monitor.

This additional functionality includes:

- 800 x 600 graphics with 16 colours
- 132 column x 43, 50 25 row text

#### VIDEO

- Dual card-edge connector to 16 bit IBM AT bus or 8 bit XT bus
- 15 pin "D" connector to analog monitors
- 9 pin "D" connector to digital monitors
- 26 pin card-edge feature connector

#### SOFTWARE/MONITOR COMPATIBILITY

It supports all of IBM's PC and PS/2 display standards, including:

- IBM Monochrome Display Adapter (MDA)
- IBM Colour Graphics Adapter (CGA)
- IBM Enhanced Graphics Adapter (EGA)
- IBM Video Graphics Array (VGA)
- Hercules Display Adapter (HDA)

The Philips VGA supports both Analog and TTL monitors:

- Philips monitors
- IBM VGA and compatibles
- EGA monitors
- CGA monitors
- Monochrome monitors
- Multi-frequency monitors

Software:

- Supports any IBM CGA, EGA, VGA, MDA or HDA compatible programs
- Designed to work with IBM PC/XT/AT, PS/2 Models 25, 30 and compatibles
- 100% IBM VGA compatible at Gate, Register and BIOS levels
- Requires DOS 2.0 or higher

#### DISPLAY ADAPTER FEATURES:

- Design based upon Chips and Technologies 82C451 high performance VLSI technology.
- Designed using surface mount technology assuring high quality and reliability
- External accessible dip switch for easy configuration
- Packaged as a two-thirds length add-on card
- 256K bytes display memory (RAM) standard.
- Operates with Philips, XT, AT and compatibles
- 100% hardware compatible with the IBM MDA, CGA, EGA, VGA and (HDA) at the BIOS, register and gate levels
- 100% software compatible with the IBM MDA, CGA, EGA, VGA, and HDA standards
- Provides both 15 pin and 9 pin connectors supporting both Analog and TTL outputs. Operates with the following monitors with a non-interlaced, flicker free display:  
IBM VGA and compatibles  
EGA  
CGA  
Monochrome  
Multi-frequency
- 8 or 16 bit interface with automatic self-configuration
- IBM VGA Feature Connector
- Supports all standard display modes, including:  
320 x 200, 256 colours or 64 grey scales  
640 x 480, 16 colours  
800 x 600, 16 colours
- Scan doubling (automatic doubling of each program generated line) for the 200 line modes
- 256 colors selectable out of a palette of 256K







## FIELD CHANGE

=====

Title: VGA451-AT does not work correct in a P3230      SInr: P3000-204  
at 12MHz. Change to VGA451-XT.

System series: P3000  
Model : P3230

Main:	Code:	New:	Service:	Serialnr:
Assy	nr.	rev.	12NC	affected
A. VGA451-AT -> -XT	5107 265 2571	4	5322 216 23052	
B. becomes	5107 265 2701	5	5322 216 23052	

Modification class: Retrofit on Failure

Date: 02-04-90

Revised:

Note:

Est.inst.time: 5 min

=====

1. CONDITION : The VGA451 does not meet worst case timing when used in a P3230 running at 12.5 MHz.
2. CORRECTION : To prevent occasional errors when running the P3230 with VGA451 at 12.5 MHz, the VGA451 should be used in 8 bit mode only in a P3230.
3. REMOVE : BIOS at position U33.  
Jumpers W2 and W3.
4. ADD : None
5. ADJUSTMENTS : None
6. PARTS : None
7. STATUS CHANGE : (for P3230 only)  
VGA451-AT PCB changes to VGA451-XT PCB  
5107 265 25714      5107 265 17015  
  
Service 12NC: 5322 216 23052 is not changed.
8. TEST FACILITIES  
AFFECTED : None
9. DOCUMENTS  
AFFECTED : PC options CE Manual, 12NC: 5122 991 37613
10. REMARKS : This SI does not refer to the latest VGA451 revision level. It has been issued to provide better insight in the modification history of the VGA451.

Responsibility: R.Kayzer

*R.Kayzer*



2000

1. The first part of the document is a letter from the President of the United States to the Congress, dated January 1, 1801. It is a very important document, as it is the first time the President has addressed the Congress since the establishment of the new government.

2. The second part of the document is a report from the Secretary of the Treasury, dated January 1, 1801. It contains information about the state of the nation's finances, including the amount of money in the treasury and the amount of money that has been spent.

3. The third part of the document is a report from the Secretary of the Navy, dated January 1, 1801. It contains information about the state of the navy, including the number of ships and the amount of money that has been spent on the navy.

4. The fourth part of the document is a report from the Secretary of the War, dated January 1, 1801. It contains information about the state of the army, including the number of soldiers and the amount of money that has been spent on the army.

5. The fifth part of the document is a report from the Secretary of the Interior, dated January 1, 1801. It contains information about the state of the interior, including the number of people living in the interior and the amount of money that has been spent on the interior.

6. The sixth part of the document is a report from the Secretary of the State, dated January 1, 1801. It contains information about the state of the state, including the number of people living in the state and the amount of money that has been spent on the state.

7. The seventh part of the document is a report from the Secretary of the War, dated January 1, 1801. It contains information about the state of the army, including the number of soldiers and the amount of money that has been spent on the army.

8. The eighth part of the document is a report from the Secretary of the Navy, dated January 1, 1801. It contains information about the state of the navy, including the number of ships and the amount of money that has been spent on the navy.

9. The ninth part of the document is a report from the Secretary of the Treasury, dated January 1, 1801. It contains information about the state of the nation's finances, including the amount of money in the treasury and the amount of money that has been spent.

10. The tenth part of the document is a report from the Secretary of the State, dated January 1, 1801. It contains information about the state of the state, including the number of people living in the state and the amount of money that has been spent on the state.

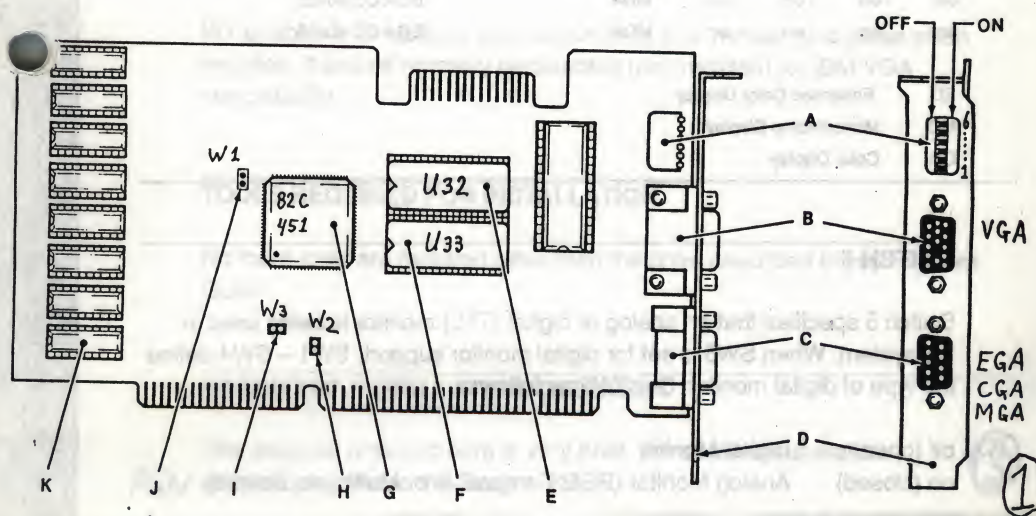
## PARTS OF THE VGA ADAPTER

Figure 1 shows the layout of the VGA Adapter, with the following parts identified:

- A Switches: SW1 is at the bottom; the OFF position is to the left
- B Analog (15-pin) Video Connector
- C Digital (9-pin) Video Connector
- D Slot Cover
- E BIOS Chip U32
- F BIOS Chip U33
- G 82C451 Integrated Video Processor
- H Jumper W2
- I Jumper W3
- J Jumper W1
- K Video RAM (Memory).

5107 265 27015

FIGURE 1. SWITCH, JUMPER AND CONNECTOR LOCATIONS



**Table 2: Enhanced operating modes and resolutions.**

Mode	Type	Pixels	Colours	Text	Font	RAM	VGA	MS	MS +	MS + +
hgc	graphics	720X350	MONO	80X25	9X16	256KB	x	x	x	x
34	text	1056X352	16	132X44	8X8	256KB	x	x	x	x
35	text	1056X350	16	132X25	8X14	256KB	x	x	x	x
36	text	1056X364	16	132X28	9X13	256KB	x	x	x	x
37	graphics	640X460	16	80X60	8X8	256KB	x	x	x	x
38	text	640X480	16	80X60	8X8	256KB	x	x	x	x
41 <sup>1</sup>	graphics	800X600	16	100X40	8X15	256KB		x	x	x
42 <sup>1</sup>	text	800X600	16	100X40	8X15	256KB		x	x	x
45	graphics	640X350	256	80X25	8X14	256KB	x	x	x	x
46	graphics	640X480	256	80X30	8X16	512KB	x	x	x	x
47	graphics	640X400	256	80X25	8X15	256KB	x	x	x	x
48 <sup>1</sup>	graphics	800X600	256	100X40	8X15	512KB		x	x	x
55 <sup>2</sup>	graphics	1024X768	16	128X48	8X15	512KB			x	x
56 <sup>2</sup>	graphics	1024X768	256	128X48	8X15	1024KB			x	x

**Note 1:** User selectable for 35.5 kHz or 38 kHz

**Note 2:** User selectable for 35.5 kHz (Interlaced) or 38 kHz (non-interlaced)

**VGA** Analog up to 31.5 kHz

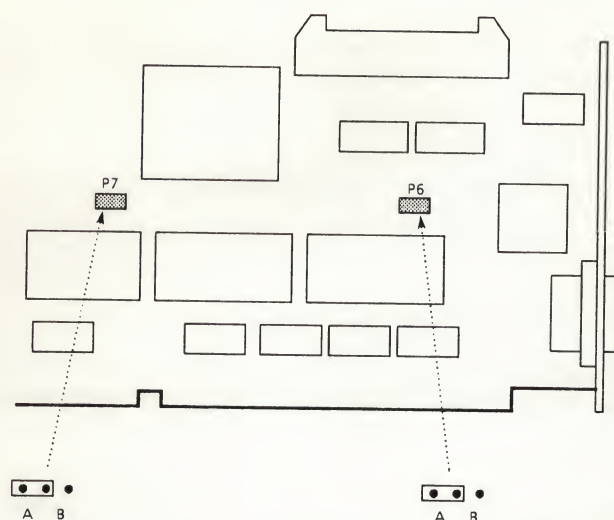
**MS** Multisync, analog up to 35 kHz

**MS +** High performance multisync, analog- up to 36 kHz, including 1024 x 768 interlaced

**MS + +** Super high performance, multisync, up to 48 KHz.- analog including 1024x768 non-interlaced.



### 16.13.3. Strap setting /Adjustments Cardinal VGA700



STRAP SETTINGS		
P6	A-Position	Video interrupt disabled (default)
	B-Position	Video interrupt enabled
P7	A-Position	16-bit Video BIOS ROM acces
	B-Position	8-bit Video BIOS ROM acces

### 16.13.4. Installation / Maintenance

#### Utilities

With the VGA700 card the following programs are. delivered:

- **SETUP** Help program to copy the desired programs onto the hard disk
- **Video mode selection:**  
Allows the user to choose an emulation mode. This can be VGA, EGA, CGA, MDA, or Hercules.
- **Text mode selection:**  
Allows the user to choose the number of rows and columns on text screens.



- **Diagnostics:**

This program tests the functionality of the VGA700 card.

- **BIOS relocater:**

Relocates the graphics BIOS memory in RAM which provides higher speed graphics performance (Not needed if the system can handle BIOS shadowing).

- **Extended mode drivers:**

These programs enable the use of the extended mode features of the VGA700 while using applications.

There are drivers for Windows, Word perfect and others.

**Video Emulation Selection Utilities.**

- Install the VGA700 utilities on your system disk.
- Take note that if you want to use the 6CM monitor (38 kHz operation) in the 800 x 600 mode that the following command must be run before running any application software:

**VMODE 38K <CR>**

- If your computer is capable of 48 kHz operation (i.e. non-interlaced 1024x768 resolution), type:

**VMODE 65K <CR>**

***Note:** This must be done before running any application software.*

- The card is standard delivered to operate with 16-bit BIOS access, but for the P3361 and P3371, it is set to 8-bit to prevent startup problems due to high bus speed. This has only effect at power on for the performance, since the BIOS can be shadowed.
- With the VGA700 kit also a user manual is delivered. for more information consult this manual

**The MS-Windows 3.0 Driver Installation.**

1. If MS-Windows 3.0 is not already installed and working, install the program and use the built-in 640x480x16 colours resolution
2. Run the drivers SETUP program belonging to the VGA700 software (diskette 1) and install the Windows 3.0 driver program.
3. After the driver has been installed, move to the Windows 3.0 directory and run the Microsoft Windows SETUP program.
4. From the menu, select the display type and press ENTER to change it.
5. A list of available drivers will be displayed. Select the VGA700 driver option with the resolution corresponding to the driver you installed.
6. Complete the program; Windows 3.0 will now use the new display driver.

